Combining weights or relative magnitudes of Atoms


*D. R. Harrison sc*

See page 16

A

# SYSTEM

OF

# MATERIA MEDICA

AND

# PHARMACY,

INCLUDING TRANSLATIONS OF THE

EDINBURGH, LONDON, AND DUBLIN PHARMACOPŒIAS.


By JOHN MURRAY, M. D.

FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS, OF THE ROYAL SOCIETY
OF EDINBURGH, THE GEOLOGICAL SOCIETY OF LONDON, &c.;
LECTURER ON CHEMISTRY, AND ON MATERIA
MEDICA AND PHARMACY.


SIXTH EDITION.

ADAPTED TO THE PRESENT STATE OF CHEMICAL AND MEDICAL SCIENCE,


By JOHN MURRAY, M. D.

FELLOW OF THE ROYAL COLLEGE OF SURGEONS OF EDINBURGH; LECTURER
ON CHEMISTRY; MEMBER AND FORMERLY PRESIDENT OF THE ROYAL
PHYSICAL SOCIETY; MEMBER OF THE ROYAL MEDICAL SOCIETY,
THE HUNTERIAN SOCIETY, &c.


## WITH NOTES AND ADDITIONS

BY




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NEW-YORK:

*W. E. DEAN, PRINTER, 32 ANN-STREET.*

COLLINS AND HANNAY, AND J. B. COLLINS.

1834.

TO

JOHN AUGUSTINE SMITH, M.D.

PROFESSOR OF ANATOMY AND PHYSIOLOGY IN THE UNIVERSITY OF THE STATE OF NEW-YORK, &c. &c.

THE PRESENT EDITION OF THIS WORK IS DEDICATED,

AS A SLIGHT EVIDENCE OF THE RESPECT ENTERTAINED

FOR HIS CHARACTER AND TALENTS,

BY HIS FRIEND AND COLLEAGUE,

THE EDITOR.

# NOTICE.

There is, perhaps, no work on the Materia Medica that has enjoyed a higher or more deserved reputation than that of Dr. Murray. Although originally published many years since, it still retains its rank as a medical classic. As a text-book, it is one of the best that we possess, and, as such, the Editor has been in the habit of recommending it, in connection with the valuable Pharmacologia of Dr. Paris. In the present edition it will be observed that a great number of important changes have been made in the work by the English Editor. Indeed, it has been completely modernized, and made to correspond with existing improvements. In the additions by the American Editor, the principle of selection has been observed, and such articles only have been added as appear to have a permanent claim to notice.

J. B. B.

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## PART I.—MATERIA MEDICA.



## PART II.—PHARMACY.

# PREFACE

BY THE ENGLISH EDITOR.

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This Treatise, on a more limited scale, was originally designed by my Father to afford an Outline of his Course of Lectures on Materia Medica and Pharmacy. Subsequently he changed the plan of arrangement of these Lectures; but the demand for the work continuing, he was induced to enlarge it into a systematic view of these departments of medical science. The history of the Materia Medica, which before consisted of a mass of insulated facts and vague speculations, he connected by philosophical principles, and moulded into a scientific form; and such indeed is the excellence of the classification of medicines which he proposed, that it is still, after a lapse of twenty years, admitted to be the best on the subject, and forms the basis of some of the latest treatises on this branch of science. The portion of the work relating to Pharmacy included translations of the Pharmacopœias published by the Colleges of Edinburgh, London, and Dublin, the analogous processes being placed together, and the order being that of the Edinburgh Pharmacopœia. On the merits of the original work I need not dilate: it has met with general approval, both as an elementary treatise and as a systematic authority, and other works of celebrity have derived much from it that is acknowledged, and some not a little, of which no acknowledgment is given.

The present is the third edition of my Father's work which I have published; and as no pains have been spared to render it accurate and complete, so the continued demand for it encourages me to hope that it has not declined in estimation.

Though the leading principles of the work have not required modification, it has been found necessary to make alterations to a considerable extent in the details. The publication of new editions of the London Pharmacopœia in 1824, and the Dublin Pharmacopœia in 1826, both of them much altered and much improved, rendered it necessary to make corresponding changes in this work. I have accordingly inserted, under the proper classes, the new substances introduced into the list of the Materia Medica, adding some notice of their properties and medicinal action; the new formulæ are translated, and explanations given of the nature of each process, the advantages it possesses,

or objections to which it may be liable. In drawing up these observations, I have derived much assistance from the remarks of Mr. R. Phillips and Mr. Brande relative to the London Pharmacopœia, from the accurate and judicious "Observations on the Dublin Pharmacopœia" by Dr. Barker and Dr. Montgomery, and from the mass of original and valuable information which the late distinguished Professor of Materia Medica at this University, Dr. A. Duncan, had embodied in his Dispensatory.

The progress of chemical knowledge has obliged me to introduce considerable alterations in the parts of the work referring to that science, by omitting what had become obsolete, or opposed to the present opinions, and supplying what more recent investigations have established. The defects pointed out by my Father in the processes of former Pharmacopœias having been avoided in the improved formulæ, and not unfrequently modifications adopted which he originally suggested, it became unnecessary to retain discussions that were no longer applicable. The statements regarding the constitution of chemical compounds I have corrected, in conformity with the precision which the atomic theory has given to this part of chemistry, and have added a table, from the best authorities, of the equivalents of the principal substances used in Pharmacy. A table, representing the relative magnitudes of the atoms of simple bodies, is also prefixed, that may serve to illustrate the atomic doctrine, and assist the student in recollecting a series of numbers which are the elements of all the combinations involved in medical chemistry. To render more intelligible the chemical changes that take place in many of the pharmaceutic processes, I have, by permission of my friend, Dr. D. Boswell Reid, made use of diagrams of a form contrived by him for this purpose, and which are well adapted for displaying those changes in a clear and exact manner.

Under the history of arsenic, corrosive sublimate, lead, and other substances which act in a deleterious manner on the human frame, I have described the symptoms they occasion, the antidotes that may be employed, and the methods of chemical investigation by which these substances are identified. The very able work of Dr. Christison on Poisons is the authority I have chiefly consulted, and to which, for more ample details, I refer.

The importance which has, of late years, been assigned in Medical Botany to the natural affinities of plants, as throwing light on their medicinal operation, has led me to add to the Linnean system, that was before followed in this work, the natural orders of Jussieu, adopting also some of the modifications introduced by De Candolle and Richard. A tabular view is given of the two systems; and to the description of each plant included in the Materia Medica are prefixed the class, order, and natural order to which it belongs. In the history of plants I have

also paid attention to the discoveries in Organic Chemistry of the active principles on which their medicinal virtues depend; the methods of obtaining the more important of these principles are stated, and the circumstances pointed out which may modify or impair their activity in the forms under which they are administered.

Notwithstanding that much new matter has been added, I have been enabled, by a closer method of printing, and by the omission of repetitions in the two parts of which the work consisted, to reduce it materially in size, so that the two volumes are now formed into one. The change brings the work into a more convenient and less expensive shape, while I have carefully guarded against the omission of any facts or principles that appeared to be of importance.

*Edinburgh, 24th October*, 1832.

# INTRODUCTION.

Medical Science, considered as relating to the treatment of disease, may be presented under two points of view. Under one, diseases are defined and classed; their symptoms are described, their causes investigated, the indications are delivered by which their cure is to be attempted, and the remedies are enumerated by which these indications are to be fulfilled. When this method is followed, a previous knowledge is supposed of the natural history, and the properties of the substances employed as remedies; and they are no farther subjects of attention, than in so far as regards their applications to particular cases, and the cautions which peculiarity of circumstances may render necessary in their administration.

But the subject may also be presented under another aspect. The symptoms of diseases, their causes, and indications of cure, may be supposed to be known, and the remedies themselves become principally the objects of study,—their natural characters, their sensible qualities, their effects on the living system, the theory of their action, and their applications to the treatment of morbid affections, forming so many subjects of description or investigation. This constitutes the department of Materia Medica—understood in the most extensive signification of the term.

The medicinal powers of bodies are intimately connected with their chemical composition, depending often on the presence of active ingredients, which form only a small part of the entire mass, and liable to be greatly affected by chemical combination. Hence arises the necessity of attending to the chemical nature of remedies, their constituent principles, and the re-action of these on each other.

Of the various substances employed in medicine, some are administered in the state in which they occur in nature; but the greater number are subjected to certain previous processes, by which their medicinal powers are concentrated or modified, so that they may act with more certainty and energy, and not unfrequently in an altogether different manner from what they would do if administered in their native state.

To embrace these different subjects of inquiry, the following arrangement is adopted in this work. In the introductory portion an analysis may be given of the chemical nature of the articles of the Materia Medica, with some remarks on the chemical changes to which they are subjected in their preparation as remedies. Next may be delivered the history of the substances used in medicine, constituting what is regarded as Materia Medica in the more limited sense attached to the term. Lastly may be considered the various

processes to which these substances are subjected with the view of preparing them for administration, forming what is denominated Pharmacy.

### Sect. 1.—Of the chemical analysis of the articles of the materia medica.

The ultimate object of chemical investigations is to discover the composition of bodies; and the result of these investigations is the reducing them into two classes, those which are Simple and those which are Compound. The former are such as consist of parts perfectly alike; the most minute particles into which a simple body can be resolved retaining all its essential properties, and being similar to each other. The latter can, on the contrary, be resolved into substances different in their qualities from each other, and from the compound which they form.

It is from the union of simple substances that compounds are produced. When two simple bodies are placed under those circumstances which favour the exertion of their mutual attraction, they unite and form a compound, having peculiar properties. These compounds are farther capable of combining with other simple bodies, or with each other, which gives rise to a series of compounds still more extensive; and these again are capable of new combinations, or of such intimate mixtures with each other, as to form many peculiar substances. There are thus produced from a few elements all the products of nature, and all those which are the result of the operations of art.

It is the province of Chemistry to trace these combinations; to determine whether bodies are simple or compound; and, if compound, to ascertain the number of their constituent principles, the proportions, and the modes in which they are combined.

The general process by which these objects are attained, is termed, in the language of Chemistry, Analysis. It is merely the separation of a compound body into its constituent parts, and is effected either by the agency of heat, or by the exertion of a superior attraction.

The analysis from the application of heat differs according to the composition of the body analysed. If a compound, consisting of two simple substances, be exposed to heat, it in many cases happens that the mutual attraction by which its principles were united ceases, and a decomposition or separation of these principles takes place. This is an example of pure analysis; no change being produced, but merely the separation of the component parts of the compound, so that each is obtained in its original state.

An analysis more complicated is that where several substances are combined together, in such a manner that their attractions are balanced, and one compound is formed. When a compound of this kind is exposed to a high temperature, this balance is frequently subverted, and it suffers decomposition. But its constituent principles, instead of passing off pure, enter into new combinations with each other, and form other compounds, each of which may be collected,

and in its turn analysed. It is in this manner that vegetable and animal substances are acted on by heat: the products afforded by their analysis are not such as pre-existed in them, but are compounds formed during the decomposition, by new combinations of their ultimate principles. This is what has been named False or Complicated Analysis.

Chemical analysis is also effected by the exertion of a superior attraction. If a compound be placed successively with different substances in situations favourable to the operation of chemical action, one or other of them may exert a superior attraction to either of its component parts; a decomposition will be produced, and from the products the constituent principles of the compound, as well as their proportions, may be determined.

As compound substances can combine together so as to form a new compound, it is obvious that this compound may be resolved either into the immediate principles from the union of which it has been formed, or into those of which these consist. It is necessary, therefore, that these should be distinguished. The former are accordingly named the Proximate Principles of a compound; the latter the Ultimate Principles. The proximate principles are compounds; the ultimate principles are the elements of these compounds.

When by analysis the constituent principles of a body have been obtained, they may often be combined, so as to reproduce the substance analysed. This operation is named Chemical Synthesis, and, when it can be effected, is the surest proof of the accuracy of the analysis. It is difficult to apply it to those compounds which suffer a complicated analysis; and hence the composition of vegetable or animal substances can seldom be confirmed by a synthetic experiment. The production of fat by the combination of watery vapour with olefiant gas, of artificial urea, tannin, &c. are instances of such synthesis; but there are few examples of this kind.

In analysing the various products of nature, we arrive ultimately at substances which we are unable to decompose, and which are therefore regarded as simple. The absolute simplicity of these is not indeed established; for our inability to decompose them may not arise from this, but from the imperfections of our modes of analysis; and it is even probable, that all the substances which are yet known to us may be compounds, and that a more refined chemistry may discover their composition. Until this be effected, however, they are regarded as simple, and they are so with regard to our knowledge of them. As the ultimate principles, therefore, of all analysis, they are first to be considered in proceeding to the general analysis of the articles of the Materia Medica.

Of these bodies, Oxygen is the most important. There is no simple substance which exerts an attraction to so many others, or which gives rise to such important compounds. With a few exceptions, indeed, all the productions of nature are either capable of combining, or are already combined, with this principle, and the developement of its agencies constitutes the most extensive and important part of chemical science.

Oxygen, when uncombined, exists in the gaseous state. Like

other gases, it is invisible and elastic; its specific gravity is rather greater than that of atmospheric air; it is absorbed by water, but in a very small proportion. The distinguishing properties of oxygen gas are those of supporting respiration and combustion. It is the only air which, strictly speaking, can support respiration; other aëriform fluids doing so only from the oxygen they contain. It also sustains combustion longer and more brilliantly than any other gas. The combination of a body with oxygen is termed Oxygenation or Oxidation.

Oxygen forms one-fifth part of atmospheric air; and it is principally on its agency that the many chemical changes produced in bodies by that air depend. Combined with another elastic fluid, hydrogen, in the proportion of 8 parts to 1, it forms Water, the substance which has the most extensive operation in promoting chemical action by the fluidity it communicates, and which more directly produces important chemical changes, by affording oxygen to bodies. Oxygen exists too as a constituent principle of the greater number of the acids, and communicates to them their energy of action. It enters also into the composition of the alkalis and earths; all these, with the exception of ammonia, being compounds of a metallic base and oxygen. With all the metals it combines, communicating to them a greater susceptibility of chemical action, and greater activity in their relation to the living system; and it exists as a constituent part of nearly all the vegetable and animal products. Hence no principle is more extensively diffused, and none has a more marked influence in the combinations into which it enters. Its chemical equivalent or combining quantity is represented on the atomic theory, or the doctrine of definite combinations, by the number 8, in reference to that of hydrogen as 1*.

* It is not attempted here to give any outline of the atomic theory, that important doctrine, the influence of which extends through the whole of chemistry, and regulates all the details regarding the combinations of bodies. It may be merely stated, that the leading principle of this doctrine is, that every substance has a certain combining proportion in which only it will unite with other bodies. Thus, to take the instances of the three simple substances, *hydrogen*, *carbon*, and *oxygen*, the combining weights of these bodies are as the numbers 1, 6, and 8; that is, hydrogen combines with carbon in the proportion of one part of hydrogen with six parts of carbon; hydrogen combines with oxygen in the proportion of one part of hydrogen to eight parts of oxygen; and carbon combines with oxygen in the proportion of six parts of the former to eight parts of the latter. Or, in the compound of hydrogen and carbon, there will always be six parts by weight of carbon to one part by weight of hydrogen; in the compound of carbon and oxygen there are always six parts by weight of the former to eight parts of the latter; and in the compound of oxygen and hydrogen, there are eight parts of oxygen to one part of hydrogen. All simple bodies, in like manner, have certain invariable and peculiar combining weights.

The reason of this singular law is supposed to be, that chemical combination happens between the atoms or ultimate particles of bodies, and that the atoms of each body are of a specific size and weight; that is, recurring to the instances which have been given, an atom of carbon is *six* times the size and weight of an atom of hydrogen, and an atom of oxygen *eight* times the size and weight of an atom of hydrogen. It is to illustrate this view, that the table of the atomic weights of bodies at the commencement of this work is constructed. The atoms of the different simple bodies, which either in their simple state, or in a state of combination, are employed in medicine, are represented of their specific magnitudes in relation to each other, and as denoted by the attached numbers. By the mere inspection of this table, the composition of any compound used in medicine may be determined; thus, if we wish to

The elastic fluid which, with oxygen gas, composes atmospheric air, is name Azote or Nitrogen; it constitutes four-fifths of the atmosphere. It, too, is a simple substance; its chemical agency is less powerful than that of oxygen, nor does it possess any very remarkable property by which it can be characterized. It is lighter than oxygen gas, is incapable of supporting combustion or respiration, is scarcely sensibly absorbed by water, and is not combustible in the strict sense of the term; for although it combines with oxygen, the combination is not rapid, and is not attended with any sensible emission of heat or light. Nitrogen combined with a large proportion of oxygen forms a powerful acid, the nitric acid; in lower degrees of oxygenation it forms two other acids, and also two compounds, nitric oxide and nitrous oxide, which have no acid powers. With hydrogen it forms ammonia, one of the alkalis; it exists also in several of the vegetable alkalis, in prussic acid, (the base of which, cyanogen, is a compound of carbon and nitrogen,) and some other vegetable substances, and is a constituent principle of nearly all the varieties of animal matter. Its chemical equivalent is 14.

Atmospheric Air, of which oxygen and nitrogen are the essential constituent parts, has merely the aggregate properties of these two gases, their combination being so slight, that no new powers are acquired from it; and, as the oxygen is the more energetic ingredient, the chemical agencies of this air depend chiefly on the operation of this principle. It yields oxygen to a number of substances with more or less rapidity, and thus changes their chemical constitution. It sometimes acts too by communicating humidity: and, in a few cases, by affording an elastic fluid, carbonic acid gas, which is diffused through it in small proportion. Its nitrogen exerts no active power, but apparently serves merely to dilute, and thus to moderate the action of the oxygen gas.

Hydrogen is another elastic fluid, which in the system of modern chemistry has been regarded as elementary. It has a better claim to be regarded as such than any other body, as its atomic weight is less than that of any substance with which we are acquainted; whence it may be presumed, that none of these exist in it. Dr. Prout made the singular discovery, that the atomic weights of all bodies are simple multiples of the atomic weight of hydrogen; hence, if the atom of hydrogen be represented in a scale of combining weights by unity, the atomic weights of all other bodies will be represented in relation to it by whole numbers. Hydrogen is the lightest of all the aëriform fluids, and the lightest substance, therefore, whose gravity we can ascertain. It is distinguished farther by

know the composition of oxide of iron, we observe, that the equivalent of oxygen is 8, and that of iron 28; hence, oxide of iron must consist of eight parts of oxygen, and 28 parts of iron; adding these together, the sum 36 becomes the equivalent of oxide of iron, and in any combination of it with an acid, the proportion of the oxide of iron will be as 36 to the equivalent number of the acid. In this simple manner is the whole system of chemical combinations derived from a few numbers. The coloured spheres represent the atoms of the bodies, the colours being those of the bodies, and the relative magnitudes of the spheres corresponding to the equivalent numbers. It is of course not implied that the atoms of bodies must be spheres; but whatever their forms are, these must be their relative magnitudes.

its high inflammability; it burns when an ignited body is approached to it in contact with atmospheric air, and explodes if previously mixed with it. The product of its combustion is water, which is therefore a compound of it with oxygen. Combined with nitrogen, it forms ammonia: with the primary inflammables, sulphur, carbon, and phosphorus, it forms compound gases: it combines with chlorine, forming muriatic acid, and with cyanogen it forms the prussic or hydrocyanic acid: lastly, it is an abundant ingredient in vegetable and animal substances.

WATER, which is a compound of one atom of oxygen 8, and one of hydrogen 1, and is therefore represented by the number 9, is a substance extremely peculiar in its chemical relations. Its power of combination is extensive, there being few substances on which it does not act, or with which it does not combine; yet in the greater number of these combinations no energetic action is displayed; it scarcely produces any alteration of properties; and hence its most important operation is the communicating that state of fluidity to bodies which is necessary to their mutual chemical action. It is more peculiarly the solvent of all saline substances, and of the greater number of the earths; and it dissolves many of the vegetable and animal products. When it communicates oxygen, it produces important changes. Several of the metals are slowly oxidated by it; and when they are dissolved by acids, it often acts by affording to them that oxygen which is necessary for their solution. Vegetable and animal substances often suffer chemical changes from the oxygen which water imparts, as well as from the fluidity it communicates favouring the reaction of their constituent parts; and in their decomposition at elevated temperatures, the elements of the water they contain enter into the composition of the products which these decompositions afford.

CHLORINE, or as it used formerly to be named, Oxymuriatic Acid, is an important chemical agent. It exists as a gas of a green colour, having a very pungent suffocating odour, heavier than air in the proportion as 2.5 to 1, and which is rapidly absorbed by water. It has a remarkable power of destroying animal and vegetable colouring matter, hence the use of it in bleaching. It unites with oxygen in at least four proportions; with hydrogen it forms an acid of much energy, the muriatic; and it combines with the inflammables and the metals. Its compounds are named Chlorides; when they are dissolved in water they become, as will immediately be explained, converted into muriates.

IODINE is another simple body, bearing much analogy to Chlorine. At natural temperatures it is a solid, of a dark grey colour, but when gently heated it becomes a vapour of a purple colour. With hydrogen it forms hydriodic acid; it combines with oxygen, chlorine, and most of the metals. A character which peculiarly distinguishes it is, that it forms with the vegetable principle Starch a compound of a deep blue colour. It acts with much power on the living system.

BROMINE is analogous to Chlorine and Iodine; it has not been employed in medicine.

There are three simple substances distinguished by the property

of inflammability, and hence named Simple Inflammables, which exist as constituent principles of a number of natural products. These are carbon, sulphur, and phosphorus.

Carbon. This name is applied to the pure matter of charcoal, and indicates a principle very abundant in nature, and of much importance as a chemical agent. The Diamond is the purest form of it, and may indeed be considered as crystallized Carbon. In charcoal there is usually a portion of foreign matter; but if well prepared it is nearly a pure form of Carbon.

Carbon, besides existing as an element in the composition of many mineral bodies, is an ingredient in all substances of the vegetable and animal kingdoms. Not being volatile, it forms the principal part of the residual mass when these are decomposed by heat; and it is by this decomposition of vegetable matter, especially of the wood of plants, that it is obtained in the state of charcoal. In its combinations its chemical equivalent is 6. It unites with oxygen in three proportions, forming two acids, the Oxalic and Carbonic, and a gas named Carbonic Oxide. With hydrogen in different proportions it forms various inflammable gases. Lastly, the ternary combination of carbon, hydrogen and oxygen, in various proportions and modes of combination, appears to constitute the principal varieties of vegetable matter, and with the addition of nitrogen the different animal products.

Sulphur is found in nature principally as a constituent part of mineral bodies. It is highly inflammable; in burning it combines with oxygen, forming Sulphurous acid, a pungent and suffocating gas. With a larger proportion of oxygen, it forms a dense inodorous liquid acid, Sulphuric acid. With hydrogen, it forms an inflammable acid gas, Sulphuretted Hydrogen, which exists in nature impregnating water in the sulphurous mineral waters. This compound enters into combination with alkalis, earths and metallic oxides, and produces several important pharmaceutic preparations. Sulphur combines also with chlorine, iodine, carbon, phosphorus, and almost all the metals; its chemical equivalent is 16. It exists as a constituent part of animal substances; hence sulphuretted hydrogen is evolved in the decomposition of these by heat or putrefaction: it has also been detected in the composition of a few vegetables.

Phosphorus exists chiefly as an ingredient of animal matter, but has been lately discovered by Mr. Barry to exist in a great number of vegetables. Combined with oxygen in the state of an acid, it enters into the composition of several products of the mineral kingdom. It is of a soft consistence like wax, semi-transparent, and of a white or yellowish colour; it is so highly inflammable, that it burns spontaneously when exposed to the air.

The class of Metals is an extensive one, a number of substances having been discovered by the researches of chemists, which belong to it, besides those which have usually been known. The physical properties which have been regarded as characteristic of the metals, are opacity, great lustre, density, ductility, and malleability, but these are possessed in very different degrees by the different metals. With regard to chemical properties, the metals are fusible, in gene-

ral not volatile, except at very intense heats; they are all of them capable of combining with oxygen, chlorine and iodine, and most of them unite with the inflammables, and with each other.

Of these combinations, that with oxygen is the most important; it is effected in various modes. When heated in contact with the air, they attract its oxygen; if the temperature be highly elevated, they display during this oxidation the phenomena of combustion; even if the temperature is less elevated, several of them burn more or less rapidly; but the greater number are oxidated more slowly, and without any sensible light. Several metals are slowly oxidated by water, or by the joint action of air and water at natural temperatures. And all of them can be oxidated by acids, the acid either directly imparting oxygen to the metal, or enabling it to attract this principle from the water which is present.

In combining with oxygen, different metals unite with very different quantities of it. Each of them combines too with different proportions of oxygen, giving rise to the production, from the same metal, of oxides having different properties. The compound in which the metal is united with the smallest proportion of oxygen is termed the Protoxide; as the proportions of oxygen are greater, the names of Deutoxide, Tritoxide, are employed; and the compound in which the metal is saturated with oxygen is called the Peroxide. Several of the metals acquire in their highest degree of oxidation acid powers.

When the metals are combined with oxygen, they become capable of combining with the acids, and in doing so they acquire greater activity and power of chemical action. This previous oxidation of a metal is always necessary to its combination with an acid, and hence, when acids act on metals, they first impart to them oxygen, or enable them to attract oxygen from the water, or sometimes from the air, and then combine with the oxide that is formed. As the same metal is capable of existing in different states of oxidation, so, by combining in these states with the same acid, it forms very different compounds.

Metals are rendered active on the living system, principally by being combined with oxygen, or farther combined with acids. In their metallic state, they seldom produce any sensible effect; and any effect they do produce appears to arise from their mechanical irritation, or from their being chemically acted on by the gastric fluids. When oxidated, they become more active; and still more so when the oxide is combined with an acid. And even the degree of oxygenation considerably influences their powers; so that from the same metal preparations of very different degrees of medicinal activity may be obtained, though all agreeing in the kind of action they exert.

Some of the compounds of the metals with chlorine and with sulphur are possessed of medicinal powers.

It would be foreign to the object of this sketch to give a description of the individual metals: it is sufficient to have stated with regard to them these general facts.

The class of Earths comprises a few substances, possessing cer-

tain common properties intermediate between those of the alkalis and metallic oxides. They consist of metallic bases combined with oxygen. They are in general insipid, insoluble in water, nearly infusible by heat, uninflammable, and capable of combining with acids, so as to neutralize the acid properties. All these characters, however, are not equally appropriate ; for there are several of the earths which have a pungent taste, and are soluble in water to a considerable extent, and all of them may be fused by very intense heats.

The principal earths are Silex, Argil, Magnesia, Lime, Barytes, and Strontites : Zircon, Glucine, Ittria, and Thorina exist in such minute quantities, as to be comparatively unimportant.

Silex is an abundant ingredient, not only in mineral substances, but is frequently contained in vegetable products, and forms part of the earthy residuum of their decomposition. It is tasteless, nearly infusible, and insoluble in water, and is peculiarly distinguished by its inertness, and comparatively limited range of combination ; among the acids it combines only with the fluoric.

Argil, or Alumina, is insipid, soft to the touch, infusible, insoluble in water, and particularly distinguished by forming with that fluid a ductile plastic mass, which hardens and contracts considerably when heated. With the acids it forms compounds, which have generally a sweetish styptic taste, and which possess the property of astringency. Its chemical equivalent is 18.

Magnesia exists in the form of a very light white powder, almost insoluble in water ; it has a slightly bitter taste, changes the more delicate vegetable blue colours to a green, and combines with acids, forming compounds, in general very soluble, and having a bitter taste ; its chemical equivalent is 20.

Lime, or Calcareous Earth, displays greater energy of action. It is so far soluble in water, as to communicate to the solution a harsh styptic taste, and the power of changing the vegetable colours to green. Combined with the acids it neutralizes their properties. Its base, Calcium, has the metallic lustre, and is highly inflammable. Its chemical equivalent is 28, being composed of 20 parts of calcium, and 8 of oxygen.

Barytes surpasses lime in chemical energy. It is more soluble in water, its solution changing also the vegetable colours to green. It combines with the acids, and either from the superior strength of its attractions, or the influence of cohesion on its combinations, it decomposes the greater number of the salts of the other earths, and the alkalis. Of all the earths it is the one which acts most powerfully on the living system ; and its preparations prove poisonous to animals. Its metallic base, which in appearance resembles silver, is termed Barium.

Strontites, the last of the earths, bears a close resemblance to barytes in many of its properties ; but is less soluble in water, and is weaker in its chemical affinities. It is not poisonous, nor does it appear to exert any marked action on the living system.

Following the series of substances according to their chemical relations from the metallic oxides through the earths, it is terminated by the Alkalis. These possess the chemical property most cha-

racteristic of the whole class, that of combining with acids, neutralizing the acid properties; and they form compounds, analogous in general properties to those formed by the earths and metallic oxides with the acids. But they display still more energy in their chemical actions than the earths do, and are more remote in their qualities from the oxides of the common metals. Their taste is extremely acrid; they are highly caustic; abundantly soluble in water; they change the vegetable blue and purple colours to a green; the yellow to a brown; and they combine with oils, rendering them diffusible or soluble in water. Three of the alkalis, Potassa, Soda, and Lithia, the last of which is not used in medicine, exist naturally in a concrete state; but they are easily fused, and at a heat not exceeding ignition, are volatilized. The fourth, Ammonia, exists when uncombined as a permanent gas, but it is instantly condensed by water, and absorbed by it in large quantity.

Potash or Potassa is obtained from the ashes of land vegetables, Soda from the ashes of marine plants. They are both powerfully caustic, soluble in water, and possessed in a high degree of all the alkaline properties. Their bases, Potassium and Sodium, are solid white substances, with the lustre and every other property of metals except density; these are even lighter than water, are inflammable, and have so strong an affinity to oxygen, that it is very difficult to obtain or preserve them.

Ammonia has usually been denominated the Volatile Alkali. When uncombined it exists as a gas, having a very pungent odour; water absorbs it in very large quantity, and forms a solution of strong alkaline powers. Ammonia has not, like the fixed alkalis, a metallic base, but consists of nitrogen and hydrogen, in the proportion of one atom of nitrogen, 14, and three atoms of hydrogen, 3; hence its chemical equivalent is 17.

The last important class of chemical agents is that of Acids. Their characteristic properties are a sour taste, the power of changing the blue, purple, and green colours of vegetables to a red, and that of combining with the alkalis, earths, and metallic oxides, forming compounds, in which, when the combination is established in the due proportion, the properties of the acid, and of the base with which it is united, are neutralized. The more powerful acids have a strong attraction to water, are intimately combined with it, and can scarcely be procured free from it; they act with energy on inflammable and metallic substances.

The greater number of the acids are compounds of oxygen, but several of them, and these of considerable power, contain hydrogen as their acidifying principle. The latter are denominated Hydracids. The former have their names derived from the base, with the addition to it of the syllable *ic* when there is a large proportion of oxygen, and *ous* when there is less. Thus sulphur, by combination with oxygen, forms the two acids to which the names on this system are given of Sulphuric and Sulphurous acids. Phosphorus, in like manner acidified by oxygen, forms the Phosphoric and Phosphorous acids. In designating those acids, of which hydrogen is the acidify-

ing principle, the term *hydro* is prefixed, as in the hydrocyanic and hydrochloric acids.

Acids have an extensive power of combination. From the numerous affinities they exert, and from the facility with which they afford oxygen to different bodies, or enable them to abstract it from other substances, they are the most active of any of the compound chemical agents, and are hence employed in many pharmaceutic operations. Those of most importance under this view are the sulphuric, nitric and muriatic acids.

Sulphuric Acid consists of one atom of sulphur, 16, and three atoms of oxygen, 24, whence its equivalent is 40. It is usually combined with water, forming a liquid of great density. From its state of concentration it acts powerfully, exerting strong attractions to other bodies; and though, from the strength of affinity between its principles, it does not directly afford oxygen with facility to many substances, it enables them to attract oxygen from water, and thus subjects them to chemical change. Many of its saline compounds are applied to medicinal use. Sulphurous Acid is formed from the same base in a lower degree of oxygenation, and is much weaker in its action.

Nitric Acid is the result of the full oxygenation of nitrogen. It consists of one equivalent of nitrogen, 14, and 5 equivalents of oxygen, 40; its chemical equivalent is accordingly 54. Its oxygen not being retained by a strong attraction, the acid yields it readily, and hence acts with more facility and energy on inflammable and metallic substances than any other acid,—oxidating the former, and first oxidating, then combining with the latter. In pharmacy it is used as the most general solvent of the metals. The dense, red coloured fuming acid that is commonly known by the name of *Nitrous Acid*, is nitric acid impregnated with nitric oxide, and containing a portion of nitrous acid.

Muriatic Acid exists when uncombined in the aërial form, but it is absorbed in large quantity by water, and forms a liquid acid of considerable strength. It consists of one equivalent of chlorine, 36, and one of hydrogen, 1; hence its equivalent is 37. It combines with alkalis, earths and metallic oxides, forming compounds, which, as long as they remain in solution, are regarded as salts, and named muriates; but when the water is separated from them, and they are obtained dry, they are metallic chlorides, the hydrogen of the acid and the oxygen of the base having passed away in the state of water, leaving the metallic base and the chlorine in combination. Conversely, when a chloride of a metallic base is dissolved in water, the chlorine takes hydrogen from the water, and the base oxygen, and a muriate of an oxide results.

Carbonic Acid, the product of the full oxygenation of carbon, consists of one atom of carbon, 6, and two of oxygen, 16, = 22. It exists in the elastic form, and being absorbed by water only in sparing quantity, it exerts no very active chemical power, but is of importance from existing in many natural combinations, particularly of saline and earthy substances belonging to the Materia Medica. The characters distinguishing it are its only wekening, but not entirely

neutralizing the properties of the alkalis when in combination with them, and its being disengaged rapidly with effervescence by other acids from its saline compounds.

Phosphoric Acid has phosphorus for its base. Neither it nor its compounds are medicinally of importance. Boracic Acid is a weak acid, composed of oxygen and a base named Boron, of an olive colour, light and inflammable.

There is a series of acids with compound bases, derived from the vegetable and animal system; the more important of these will be considered under the history of the substances in which they exist.

The acids combine with the alkalis, the earths, and the metallic oxides; and when the combination is established in the due proportion, the chemical properties of the acid, and of the base with which it is united, are mutually neutralized. These compounds are named Neutral Salts. They can be obtained in the solid state: they are generally, though not universally, soluble in water; those of them which are soluble, are capable of assuming a crystalline form, the form being very different in different salts. The nomenclature of the salts is regulated by that of the acids. They are formed into genera, denominated from the acid, and the name of the base defines the species of the salt. Thus all the salts formed from sulphuric acid are considered as constituting one genus, and are named Sulphates, and the name of each species is expressed by adding the name of the base, as Sulphate of Soda, Sulphate of Lime, Sulphate of Iron, &c. The acid which sulphur forms in a different degree of oxygenation, the Sulphurous, forms a different order of salts; these are named Sulphites; and in like manner we have Nitrates and Nitrites, Phosphates and Phosphites, &c. Where there are two or more proportions of acid combined with one of base, the Latin numerals *bis* or *bi*, *ter*, *quater* or *quadro* are prefixed. Thus we have *sulphate of potash*, composed of one equivalent of sulphuric acid and one of potash, and *bisulphate of potash*, composed of *two* equivalents of sulphuric acid and one of potash. On the other hand, when the base is in excess the term *sub* is usually employed, as in the *subcarbonate* of potash. Different names are also applied to salts, according to the state of oxidation of the base. Thus, the *proto-sulphate* of iron is a compound of sulphuric acid and the *protoxide* of iron, the *per-sulphate*, a compound of sulphuric acid with the *peroxide* of iron. When an acid is combined in one compound with two bases, as sometimes happens, the names of both bases enter into the name of the salt, as Tartrate of Potash and Soda. Such salts are named *double* salts.

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So far the chemical analysis of *unorganized* substances connected with the Materia Medica has been the subject of consideration. It remains to take notice of the analysis of those belonging to the vegetable and animal kingdoms.

From the peculiar constitution of the products of organization, there are two kinds of analysis to which they are subject. The object of the one is to discover their ultimate composition; that of the

other is less refined, being confined to the investigation of the proximate principles of which they are composed.

It is seldom that a vegetable substance is homogeneous. The seed, for example, the bark, or the leaf of a plant, is not of one uniform composition, but consists of various proximate principles in a state of mixture, or of slight combination, and capable of being easily separated from each other. Now, these are often connected with their medicinal virtues ; the virtue residing perhaps not in the entire substance of the leaf, bark, or seed, but in a principle capable of being separated, and which may frequently be employed with advantage in its insulated state. Hence the importance of the analysis of the vegetable substances belonging to the Materia Medica, so far as relates to their proximate principles ; the knowledge it conveys enabling us to employ them with more discrimination, and to submit them to the proper pharmaceutic treatment. An enumeration of their proximate principles, and more particularly of those on which their medicinal powers depend, accordingly always enters into their description as articles of the Materia Medica.

This analysis is executed in various modes, adapted to particular cases, according to the principles which form the vegetable substance.

Sometimes it is effected merely by heat. The temperature cannot indeed be elevated very high, as then the proximate principles of the vegetable would be themselves decomposed, and their elements brought into new combinations. But at a heat comparatively moderate, as that of boiling water, this does not happen ; and at this temperature several of these principles, such as essential oil, camphor, and some others not very well defined, are volatilized without decomposition, and of course can be obtained pure.

The action of different solvents is of more extensive use in conducting the vegetable analysis. Water dissolves several of their component principles, such as gum and extractive matter, tannin, saline substances, and some others. Of these, the gum can be precipitated by alcohol ; the saline substances may be crystallized, or can be discovered by evaporating the solution to dryness, and exposing the mass to such a heat as will destroy the inflammable parts ; tannin and some others are detected by their appropriate chemical tests.

Alcohol is another agent of much importance in executing the vegetable analysis. It dissolves the resin, balsam, camphor, and essential oil ; these solutions are decomposed by water, each substance being separated, and discernible by its peculiar qualities. Equal parts of alcohol and water, or proof spirit, as it is named, is also often employed as a solvent in the analysis of vegetables. Ether dissolves nearly the same principles as alcohol. And the acids, alkalis, and soluble earths, are often employed as re-agents, in pointing out the existence of peculiar principles, in separating them from each other, and sometimes with the view of increasing the medicinal activity of the substance itself, or rendering it more easy of exhibition.

Lastly, in the analysis of vegetables, we are often able to procure

several of their proximate principles, by mechanical means, particularly by expression. Sometimes, too, they exude spontaneously from the growing vegetable, or are obtained from incisions made in the branches or trunk.

After we have discovered the proximate principles of a plant, or of any part of it, the next step is to ascertain their composition. This, however, is one of the most difficult of chemical investigations. There are present in almost every vegetable substance the three elements, carbon, oxygen, and hydrogen, and sometimes nitrogen; and when, according to the methods that used to be followed, the vegetable matter was exposed to heat, these elements formed a variety of compounds, which it was very difficult to collect and estimate. The mode of analysis now followed, which was suggested by Gay-Lussac and Thenard, obviates some of the difficulties. It consists in exposing a known quantity of the vegetable substance mixed with peroxide of copper, in a glass tube, to a red heat. The peroxide of copper communicating oxygen to the carbon and hydrogen of the vegetable matter converts them into carbonic acid and water, and the nitrogen, if any be present, assumes the gaseous state. These products, when collected, give the proportions of carbon, hydrogen and nitrogen; the oxygen is known by comparing the quantity of it in the carbonic acid and water with that lost by the peroxide of copper; if there be more oxygen in those products than has been lost by the peroxide, the excess must have been present in the vegetable. By this method, the ultimate composition of a number of vegetable principles has been ascertained with considerable precision.

From the analysis of vegetable substances Gay-Lussac deduced certain general conclusions, connecting the character of these bodies with their composition. He inferred, that where the oxygen in a vegetable substance is in larger proportion than suffices to convert all the hydrogen into water, that body will be of an acid nature; where, on the contrary, the hydrogen is in a greater proportion than would convert all the oxygen into water, the body will be of a resinous, oily or alcoholic nature; lastly, where the oxygen and hydrogen are in the proportion constituting water, the substance will be neither acid nor resinous, but analogous to sugar, starch, or woody fibre. These conclusions are generally correct, but there are several exceptions to them.

A class of vegetable substances has of late years been established, which contain nitrogen in a considerable proportion. These are in general of an alkaline character.

The tables which I have placed at the close of these introductory observations give the composition of most of the vegetable substances that are of any importance.

## Sect. II.—Of the general nature of pharmaceutical operations.

Of the operations of Pharmacy, the greater number and the most important are of a chemical nature, consisting of arrangements of

circumstances by which the affinities existing between bodies are favoured or counteracted. The results which they are intended to produce are Combination, in which two or more bodies unite into one compound, or Decomposition, in which bodies that were before united separate from each other; and when these results are produced, other processes are employed to procure the products.

Some preliminary operations are frequently had recourse to of a mechanical kind, to diminish the cohesion of bodies, or to enlarge their surface. Such are Pulverization, Trituration, Levigation, Granulation, &c. Pulverization is the term employed where solid bodies are reduced to powder by beating. Trituration that where the same effect is produced by continued rubbing. Levigation denotes the operation where the powder is triturated to a great degree of fineness, the trituration being facilitated by the interposition of a fluid, in which the solid is not soluble. As by any of these operations the powder must consist of particles of unequal size, the finer are separated from the coarser by sifting or washing. Sifting is passing the powder over a sieve, the interstices of which are so minute as to allow only the finer particles to pass. Washing, or Elutriation, is an operation performed on substances which are not soluble in water. The powder is diffused through a quantity of that fluid, and the mixture is allowed to remain at rest. The coarser particles quickly subside, and the finer remain suspended. The fluid is then decanted off, the powder is allowed to subside, and is afterwards dried. These methods of reducing bodies to powder can be applied to few of the metals, their force of cohesion being too strong. They are mechanically divided by rasping, or by being beat into leaves, or they are granulated,—an operation performed by melting the metal, and when it is cooled down as far as it can be, without becoming solid, pouring it into water, it passes to the solid state, assuming a granular form.

In Pharmacy, these operations are sometimes of importance, besides merely promoting chemical combination, as there are some medicines which act with more certainty, and even with more efficacy, when finely levigated, than when given in a coarse powder. As means of promoting chemical combination, it is evident that they can act only indirectly; the bodies being far from being reduced to their minute particles, between which only chemical attraction is exerted. They are therefore employed merely as preliminary to those operations in which such a division is obtained by chemical means.

Of these the first is Solution. By this is understood that operation in which a solid body combines with a fluid in such a manner that the compound retains the fluid form, and is transparent. Transparency is the test of perfect solution. When the specific gravity of a solid body differs not greatly from that of a fluid, it may be diffused through it, but the mixture is more or less opaque: and on being kept for some time at rest, the heavier body subsides; while in solution the particles of the solid are permanently suspended by the state of combination in which they exist, and are so minute as not to impair the transparency of the liquid.

The liquid has in the case of solution been regarded as the body exerting the active power, and has been named the Solvent or Menstruum ; the solid is considered as the body dissolved. The attraction, however, whence the effect arises, is reciprocal, and the form generally depends on the larger quantity of the liquid employed, and the absence of cohesion being more favourable to the combination proceeding to a greater extent.

In general, a solid can be dissolved in a liquid only in a certain quantity. This limitation of solution is named Saturation ; and when the point is reached, the liquid is said to be saturated with the solid. As the fluid approaches to saturation, the solution proceeds more slowly. When a fluid is saturated with one body, this does not prevent its dissolving a portion of another ; and in this way three, four, or five bodies may be retained in solution at the same time by one fluid. In these cases, the fluid does not dissolve so large a proportion of any of these substances as if it had been perfectly pure, though sometimes the whole proportion of solid matter dissolved is increased from the mutual affinities the bodies exert. Neither is the solvent power always thus limited, there being many cases where a solid may be dissolved in a fluid to any extent. Gum or sugar, for example, will dissolve in water in every proportion.

An increase of temperature, in general, favours solution, the solution proceeding more rapidly at a high than at a low temperature ; and in those cases in which a certain quantity only of the solid can be combined with the fluid, a larger quantity is taken up when the temperature is increased.

Agitation favours solution, by bringing the different parts of the liquid into contact with the solid, and thus preventing the diminished effect which arises from the approach to saturation in the portion covering the solid. The mechanical division of a solid, too, is favourable to its solution, principally by enlarging the surface which is acted on.

Solution is an operation frequently had recourse to in pharmaceutical chemistry, the active principles of many bodies being dissolved by their proper solvent. Salts are dissolved in water, as are also gum, extract, and other vegetable products. Products of a different kind, as resin, camphor, and essential oils, are dissolved in alcohol and wine : and metals are rendered soluble and active by the different acids. Solutions in water, alcohol, or wine, possess the sensible qualities and medical virtues of the substance dissolved. Acid and alkaline liquors change the properties of the bodies which they dissolve. In Pharmacy, the operation receives different appellations, according to the nature of the solvent, of the substance dissolved, and of the manner in which it is performed. When a fluid is poured on a vegetable matter, so as to dissolve only some of its principles, the operation is named EXTRACTION, and the part dissolved is said to be extracted. If it is performed without heat, it is termed MACERATION ; if with a moderate heat, DIGESTION ; if the fluid is poured boiling hot on the substance, and they are kept in a covered vessel till cold, it is denominated INFUSION : DECOCTION is the term given to the operation when the substances are boiled together.

Tinctures are solutions obtained by infusion or digestion in alcohol. It is evident, that these are all instances of solution, varied only by particular circumstances. Lixiviation is the term applied to solution performed on saline substances, where the soluble matter is separated, by the action of the solvent, from other substances that are insoluble; and the solution obtained in this case is termed a Ley.

The other principal method by which that fluidity, necessary to chemical action, is communicated, is Fusion. It requires merely, with regard to each substance, the necessary degree of heat; and where this is high, it is performed usually in crucibles of earthen ware, or sometimes of black lead, or on a large scale in iron pots.

Chemical combination is frequently promoted by an elevation of temperature, though the heat may not be so high as to produce fusion, but only to diminish cohesion to a certain extent. Calcination, as it used to be named, or metallic oxidation, is an example of this; a metal being heated to a high temperature, so as to enable it to combine with the oxygen of the air. Deflagration is a similar operation, an inflammable or metallic substance being exposed to a red heat in mixture with nitre; the acid of the nitre yields to oxygen; which being thus afforded in large quantity and nearly pure, the oxidation takes place rapidly, and generally to its *maximum*.

When chemical action has been exerted, other operations are sometimes required to obtain the product, or sometimes this product is formed and collected in the operation itself.

By Evaporation, or dissipating a liquid by the application of heat, a solid substance which has been dissolved in it is recovered, and this operation is one frequently performed in Pharmacy. When performed on a small scale, vessels of glass, or of earthen ware, are employed, and the heat is applied either by the medium of sand forming the sand bath, or, if it is required to be more moderate, the vessel is placed over water which is kept boiling, forming what is named the Water Bath. When performed on a larger scale, shallow iron pots or leaden troughs are used, to which the fire is directly applied; and experiments have shewn that the operation is conducted more economically when the liquor is kept boiling strongly, than when it is evaporated more slowly by a more gentle heat. There is, on the other hand, however, some loss, from part of the dissolved substance being carried off when the heat is high, by its affinity to the liquid evaporating; and in many cases in Pharmacy, particularly in the evaporation of vegetable infusions or tinctures, the flavour, and even the more active qualities of the dissolved substance, are liable to be injured, towards the end of the operation, by a strong heat.

The juices of vegetables are sometimes partially evaporated to remove part of the water, and render the juices less liable to spontaneous decomposition; this is Inspissation.

When evaporation is employed in order to obtain the volatile matter which evaporates, the process is conducted in close vessels, adapted to condense the vapour and collect the liquid. This forms

the operation of DISTILLATION, which, with regard to different substances, requires to be conducted in various modes.

When a volatile principle is to be obtained from vegetable substances by this process, the difficulty is to apply the heat sufficiently, without raising it too high. The mode employed is to heat the vegetable matter with water, and the distillation is then usually performed in the common still. At the heat of boiling water, the Essential Oil of plants, which is the chief volatile principle they contain, is volatilized; it rises with the watery vapour; is condensed: if little water has been employed, the greater part of the oil is obtained apart; if much has been used, it retains it dissolved, acquiring taste and flavour, and thus forming the Distilled Waters of plants. If alcohol, pure or diluted, has been the medium of distillation, it always retains the oil in solution, and forms what are named Distilled Spirits. The still in which the operation is performed with these views is of copper or iron; it consists of a body and head, the former designed to contain the materials, and to which the fire is applied, the latter to receive the vapour; there issues from it a tube, which is connected with a spiral tube, placed in a vessel, named the refrigeratory, filled with cold water. The vapour, in its progress through the tube, is condensed, and the liquid drops from the extremity of it.

When metallic matter would be acted on by the materials of the product of distillation, vessels of glass or earthen ware are employed; the retort, which is generally used, being connected with a single receiver, or with a range of receivers, according as the vapour is more or less easily condensed; or if the product is a permanently elastic fluid, which cannot be condensed but by passing it through water, a series of bottles, connected by tubes, on the principle of Wolfe's apparatus, is used. When the product of distillation is not perfectly pure, it can often be purified by a second distillation: the process is then named *Rectification:* when it is freed from any superfluous water combined with it, the operation is named *Dephlegmation* or *Concentration.*

When the product of volatilization is condensed, not in the liquid, but in the solid form, the process is named SUBLIMATION, and the product is a Sublimate. As the condensation, in this case, takes place with greater facility, a more simple apparatus is employed, consisting usually of a conical bottle or flask, with a round bottom, thin and equal, named a Cucurbit, on which the materials are contained, heat being applied by the medium of a sand bath. The vapour condenses in the upper part of the flask, forming a cake, which adheres to it, the orifice being lightly closed to prevent any part from being lost; or a globular head, with a groove at its under edge, and a tube to convey off any liquid that may be condensed, (a Capital as it is named,) is applied.

When a solid substance is thrown down from a liquid by chemical action, it forms the operation of PRECIPITATION, and the matter thrown down is named a Precipitate.

When a substance, in passing to the solid state, whether from fusion or solution, assumes a regular geometric form, the process is named CRYSTALLIZATION, and these figured masses are denominated

Crystals. Their forms are various, though constant with regard to each substance; they are usually transparent, hard, and have a regular internal structure. The crystallization may happen in two ways from a state of solution. If a saturated solution has been prepared with the aid of heat, the increased quantity of the solid, which the heat has enabled the liquid to dissolve, separates as the temperature falls; and the attraction of cohesion being thus slowly exerted between the particles, unites them so as to form crystals. Or if a portion of the solvent be withdrawn by evaporation, and especially by slow evaporation, the particles of the solid unite slowly, and with a similar result.

In both these kinds of crystallization from a watery solution, the crystallized substance always retains a quantity of water, and frequently even a considerable portion, in its composition. It is essential to the constitution of the crystal, its transparency, structure, and form, and is hence named the Water of Crystallization. Some crystals lose it from exposure to the air, when they are said to effloresce; others attract water, and become humid, or deliquesce.

In Pharmacy, crystallization is of importance, by enabling us to obtain substances, especially those belonging to the class of salts, in a pure form; different salts, even when present in the same solution, being thus separated by their different tendencies to crystallization, according as they are more or less soluble in the solvent, or have their solubility more or less promoted by heat, and each salt, when it does crystallize, being in general pure.

These are the principal operations of Pharmacy. Connected with this subject, there remain to be noticed the weights and measures which are usually employed. The division, according to what is named Troy weight, is that ordered in the Pharmacopœias. Its parts, with the symbols by which they are denoted, and their relative proportions, are represented in the following table:

| | | | | |
|---|---|---|---|---|
| A pound | (libra) | ℔ | contains | 12 ounces. |
| An ounce | (uncia) | ℥ | ——— | 8 drachms. |
| A drachm | (drachma) | ʒ | ——— | 3 scruples. |
| A scruple | (scrupulus) | ℈ | ——— | 20 grains (grana) gr. |

Measures have been subdivided in a similar manner, being made to correspond to the specific gravity of water. As the specific gravities of liquids vary considerably, a source of error is introduced in applying the standard measure to different liquids, unless the due allowance be made for the differences in specific gravity. This, it is to be presumed, will often be neglected, and hence the Edinburgh College have rejected the use of measures, and given the proportions of every liquid by weight. The use of measures, however, in apportioning liquids, those at least which are not too dense, being more easy and convenient, will probably always be retained; and it is therefore sanctioned by the Dublin and London Colleges. The following are the liquid measures, with their symbols:

| | | | |
|---|---|---|---|
| A gallon* | (congius) | contains | 8 pints. |
| A pint | (octarius) | O ——— | 16 fluid-ounces. |
| A fluid-ounce | (fluid-uncia) | f ℥ ——— | 8 fluid-drachms. |
| A fluid-drachm | (fluid-drachma) | f ʒ ——— | 60 minims, (minima,) ♏. |

This last measure is one newly introduced. In apportioning liquids into very small quantities, the quantity has been usually estimated by drops (guttæ, gtt.) allowed to fall from the edge of the mouth of a bottle; but the size of the drop is liable to vary, not only according to the mobility and specific gravity of the liquid, a circumstance of inferior importance, since with regard to each substance it remains the same, but also according to the thickness of the edge of the vessel, and the degree of inclination. The London College have therefore substituted this division of minims, which are measured in a slender graduated glass tube. It is necessary to recollect, that these minims have no strict relation to drops, as indeed is evident from the circumstance, that a drop is a very variable quantity, both in size and weight, from different liquids. A drop of water is equal to about a grain, but 60 grains of alcohol are equal to 175 drops of it, 60 grains of white wine to 96 drops, and 60 grains of tinctures with diluted alcohol to from 135 to 145 drops. The measures of a table and of a tea spoonful are sometimes used in extemporaneous prescription, and though not very accurate, may be admitted where a small difference in the dose is not important. The one is understood to be equal to half an ounce by measure, the other to about one drachm.

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I shall place here several tables, to which it may be sufficient afterwards to refer, as embodying a number of facts which it would occupy much space to detail separately. The first table shews the chemical composition and equivalents of the different inorganic substances used in medicine. The three following tables exhibit the composition and equivalents of vegetable substances so far as they are known. The last table presents a view of the articles of the Materia Medica, arranged according to their chemical constitution and natural characters, including the different medicinal plants, arranged on the system of Linnæus, and shewing also the natural orders of Jussieu to which they belong.

* From the 1st day of May 1826 the British liquid measures were changed by statute, the Imperial Gallon being made the standard instead of the former wine gallon; but the measures and weights used by apothecaries were exempted from this change. The following table of comparison between the Imperial measures and the Apothecary's measures is given by the Dublin College. The numbers represent Troy grains of distilled water at the temperature of 60°.

| Apothecary's Measure. | | Imperial Measure. |
|---|---|---|
| | Grains Troy. | Grains Troy. |
| Gallon | 58327.5 | 70000 |
| Pint | 7290.9 | 8750 |
| Ounce | 455.6 | 546.8 |
| Drachm | 57 | 68.3 |

*Table of the Composition and Chemical Equivalents of Substances employed in Medicine.*

| Substance. | Composition. | | Equivalent H=1. |
|---|---|---|---|
| Acid, Acetic | | | 51 |
| crystallized, 1 water = 9 | | | 60 |
| Arsenic | 1 Arsenic<br>3 Oxyen | 38<br>24 | 62 |
| Arsenious | 1 Arsenic<br>2 Oxygen | 38<br>16 | 54 |
| Benzoic | | | 120 |
| Boracic | 1 Boron<br>2 Oxygen | 8<br>16 | 24 |
| crystallized, 2 water = 18 | | | 42 |
| Carbonic | 1 Carbon<br>2 Oxygen | 6<br>16 | 22 |
| Chloric | 1 Chlorine<br>5 Oxygen | 36<br>40 | 76 |
| Citric | | | 58 |
| crystallized, 2 water = 18 | | | 76 |
| Gallic | | | 63 |
| Hydriodic | 1 Iodine<br>1 Hydrogen | 124<br>1 | 125 |
| Hydrocyanic (Prussic) | 1 Cyanogen<br>1 Hydrogen | 26<br>1 | 27 |
| Malic | 4 Carbon<br>4 Oxygen<br>3 Hydrogen | 24<br>32<br>3 | 59 |
| Muriatic | 1 Chlorine<br>1 Hydrogen | 36<br>1 | 37 |
| Nitric (dry) | 1 Nitrogen<br>5 Oxygen | 14<br>40 | 54 |
| liquid, sp. gr. 1.5, 2 water = 18 | | | 72 |
| Nitrous | 1 Nitrogen<br>4 Oxygen | = 14<br>32 | 46 |
| Oxalic | 2 Carbon<br>3 Oxygen | 12<br>24 | 36 |
| crystallized, 3 water = 27 | | | 63 |
| Phosphoric | 1 Phosphorus<br>2 Oxygen | 12<br>16 | 28 |
| Prussic | 1 Cyanogen<br>1 Hydrogen | 26<br>1 | 27 |
| Succinic | | | 50 |
| Sulphuric | 1 Sulphur<br>3 Oxygen | 16<br>24 | 40 |
| liquid, sp. gr. 1.85, 1 water | | 9 | 49 |
| Tartaric | | | 66 |
| crystallized, 1 water = 9 | | | 75 |
| Uric | 6 Carbon<br>2 Nitrogen<br>1 Oxygen | 36<br>28<br>8 | 72 |
| Alcohol | | | 23 |
| Alumina | 1 Aluminum<br>1 Oxygen | 10<br>8 | 18 |
| Ammonia | 1 Nitrogen<br>3 Hydrogen | 14<br>3 | 17 |
| Antimony | | | 44 |
| chloride | 1 Antimony<br>1 Chlorine | 44<br>36 | 80 |
| perchloride | 1 Antimony<br>2 Chlorine | 44<br>72 | 116 |

TABLE I.—(*continued.*)

| Substance. | Composition. | | Equivalent. H.=1. |
|---|---|---|---|
| Antimony, protoxide | 1 Antimony | 44 | 52 |
| | 1 Oxygen | 8 | |
| deutoxide | 1 Antimony | 44 | 56 |
| | 1½ Oxygen | 12 | |
| peroxide | 1 Antimony | 44 | 60 |
| | 2 Oxygen | 16 | |
| sulphuret | 1 Antimony | 44 | 60 |
| | 1 Sulphur | 16 | |
| Arsenic | | | 38 |
| white oxide | 1 Arsenic | 38 | 54 |
| | 2 Oxygen | 16 | |
| sulphuret (realgar) | 1 Arsenic | 38 | 54 |
| | 1 Sulphur | 16 | |
| sesquisulphuret (orpiment) | 1 Arsenic | 38 | 62 |
| | 1½ Sulphur | 24 | |
| Barium | | | 68 |
| chloride | 1 Barium | 68 | 104 |
| | 1 Chlorine | 36 | |
| Barytes | 1 Barium | 68 | 76 |
| | 1 Oxygen | 8 | |
| Bismuth | | | 72 |
| oxide | 1 Bismuth | 72 | 80 |
| | 1 Oxygen | 8 | |
| Bromine | | | 80 ? |
| Calcium, | | | 20 |
| chloride | 1 Calcium | 20 | 56 |
| | 1 Chlorine | 36 | |
| oxide (lime) | 1 Calcium | 20 | 28 |
| | 1 Oxygen | 8 | |
| Carbon | | | 6 |
| Carbonic oxide | 1 Carbon | 6 | 14 |
| | 1 Oxygen | 8 | |
| Chlorine | | | 36 |
| Copper | | | 64 |
| oxide | 1 Copper | 64 | 72 |
| | 1 Oxygen | 8 | |
| peroxide | 1 Copper | 61 | 80 |
| | 2 Oxygen | 16 | |
| Cyanogen | 2 Carbon | 12 | 26 |
| | — Nitrogen | 14 | |
| Ether | | | 37 |
| Gum | | | 90 |
| Hydrogen | | | 1 |
| carburetted | 1 Carbon | 6 | 8 |
| | 2 Hydrogen | 2 | |
| bi-carburetted | 2 Carbon | 12 | 14 |
| | 2 Hydrogen | 2 | |
| sulphuretted | 1 Sulphur | 16 | 17 |
| | 1 Hydrogen | 1 | |
| bi-sulphuretted | 2 Sulphur | 32 | 33 |
| | 1 Hydrogen | 1 | |
| Iodine | | | 124 |
| Iron | | | 28 |
| protoxide | 1 Iron | 28 | 36 |
| | 1 Oxygen | 8 | |
| peroxide | 1 Iron | 28 | 40 |
| | 1½ Oxygen | 12 | |
| sulphuret | 1 Iron | 28 | 44 |
| | 1 Sulphur | 16 | |

TABLE I.—(*continued.*)

| Substance. | Composition. | | Equivalent. H.=1. |
|---|---|---|---|
| Lead | | | 104 |
| protoxide (litharge) | 1 Lead<br>1 Oxygen | 104<br>8 | 112 |
| deutoxide (red lead) | 1 Lead<br>1½ Oxygen | 104<br>12 | 116 |
| peroxide | 1 Lead<br>2 Oxygen | 104<br>16 | 120 |
| Magnesia | 1 Magnesium<br>1 Oxygen | 12<br>8 | 20 |
| Manganese, tritoxide | 1 Manganese<br>2 Oxygen | 28<br>16 | 44 |
| Mercury | | | 200 |
| protoxide | 1 Mercury<br>1 Oxygen | 200<br>8 | 208 |
| peroxide | 1 Mercury<br>2 Oxygen | 200<br>16 | 216 |
| chloride (calomel) | 1 Mercury<br>1 Chlorine | 200<br>36 | 236 |
| bi-chloride (corrosive sublimate) | 1 Mercury<br>2 Chlorine | 200<br>72 | 272 |
| sulphuret | 1 Mercury<br>1 Sulphur | 200<br>16 | 216 |
| bi-sulphuret (cinnabar) | 1 Mercury<br>2 Sulphur | 200<br>32 | 232 |
| bi-cyanide | 1 Mercury<br>2 Cyanogen | 200<br>52 | 252 |
| Nitrogen | | | 14 |
| Olive Oil | | | 79 |
| Oxygen | | | 8 |
| Phosphorus | | | 12 |
| Potassium | | | 40 |
| chloride | 1 Potassium<br>1 Chlorine | 40<br>36 | 76 |
| oxide (potash) | 1 Potassium<br>1 Oxygen | 40<br>8 | 48 |
| | hydrate 1 water = 9 | | 57 |
| sulphuret | 1 Potassium<br>1 Sulphur | 40<br>16 | 56 |
| Silver | | | 110 |
| chloride | 1 Silver<br>1 Chlorine | 110<br>36 | 146 |
| oxide | 1 Silver<br>1 Oxygen | 110<br>8 | 118 |
| Sodium | | | 24 |
| chloride | Sodium<br>1 Chlorine | 24<br>36 | 60 |
| iodide | 1 Sodium<br>1 Iodine | 24<br>124 | 148 |
| oxide (soda) | 1 Sodium<br>1 Oxygen | 24<br>8 | 32 |
| Sulphur | | | 16 |
| Water | 1 Oxygen<br>1 Hydrogen | 8<br>1 | 9 |
| Zinc | | | 34 |
| oxide | 1 Zinc<br>1 Oxygen | 34<br>8 | 42 |

TABLE I.—(*continued.*)

| SALTS. | Base. | Acid. | Water 1 atom =9. | Equivalent of the Salts H.=1. |
|---|---|---|---|---|
| Alumina, sulphate | 18 | 40 | | 58 |
| and potash, sulphate of (alum) dry | 54+48 | 160 | . | 262 |
| crys. 25 water (common alum) | 54+48 | 160 | 225 | 487 |
| Ammonia, acetate | 17 | 51 | | 68 |
| cryst. 7 water | 17 | 51 | 63 | 131 |
| carbonate | 17 | 22 | | 39 |
| bi-carbonate | 17 | 44 | | 61 |
| cryst. 1 water | 17 | 44 | 9 | 70 |
| sesquicarbonate, 1 water | 17 | 33 | 9 | 59 |
| muriate (sal ammoniac) | 17 | 37 | | 54 |
| oxalate, cryst. 2 water | 17 | 36 | 18 | 71 |
| phosphate | 17 | 28 | | 45 |
| cryst. 2 water | 17 | 28 | 18 | 63 |
| succinate | 17 | 50 | | 67 |
| sulphate, cryst. 1 water | 17 | 40 | 9 | 66 |
| Antimony protoxide | | | | 52 |
| hydro-sulphuret (kermes mineral) | 52 | 17 | | 69 |
| sulphuretted hydro-sulphuret (golden sulphur) | 52 | 33 | | 85 |
| tartrate of potash and 3 water (tartar-emetic) | 156+48 | 132 | 27 | 363 |
| Barytes | | | | 76 |
| carbonate | 76 | 22 | | 98 |
| muriate, cryst. 1 water | 76 | 37 | 9 | 122 |
| nitrate | 76 | 54 | | 130 |
| sulphate | 76 | 40 | | 116 |
| Bismuth, protoxide | | | | 80 |
| sub-nitrate (trisnitrate) | 240 | 54 | | 294 |
| tartrate, 5 water | 80 | 66 | 45 | 191 |
| Copper, peroxide | | | | 80 |
| acetate, cryst. 6 water (common verdegris) | 80 | 51 | 54 | 185 |
| bin-acetate, cryst. 3 water (distilled verdegris | 80 | 102 | 27 | 209 |
| subacetate (1 acid and 2 base) | 160 | 51 | | 211 |
| carbonate | 80 | 22 | | 102 |
| bi-nitrate | 80 | 108 | | 188 |
| sub-nitrate (1 acid and 4 peroxide) | 320 | 54 | | 374 |
| bi-sulphate | 80 | 80 | | 160 |
| crystallized (blue vitriol) 10 water | 80 | 80 | 90 | 250 |
| Iron (protoxide) | | | | 36 |
| peroxide | | | | 40 |
| acetate, 3 water | 36 | 51 | 27 | 114 |
| carbonate | 36 | 22 | | 58 |
| muriate, 3 water | 36 | 37 | 27 | 100 |
| succinate | 40 | 50 | | 90 |
| sulphate | 36 | 40 | | 76 |
| cryst. 7 water (green vitriol) | 36 | 40 | 63 | 139 |
| sesquisulphate (peroxide) | 40 | 60 | | 100 |
| Lead, protoxide | | | | 112 |
| acetate | 112 | 51 | | 163 |
| cryst. 3 water | 112 | 51 | 27 | 190 |
| subacetate (2 base) | 224 | 51 | | 275 |
| carbonate | 112 | 22 | | 134 |
| Lime | | | | 28 |
| carbonate | 28 | 22 | | 50 |
| sub-chloride, 6 water | 56 | 36 | 54 | 146 |
| muriate, crys. 6 water | 28 | 37 | 54 | 119 |

| TABLE I.—(*continued.*) | Base. | Acid. | Water 1 atom =9. | Equivalent of the Salts H.=1. |
|---|---|---|---|---|
| Lime, oxalate | 28 | 36 | | 64 |
| phosphate | 28 | 28 | | 56 |
| sulphate | 28 | 40 | | 68 |
| tartrate, 4 water | 28 | 66 | 36 | 130 |
| Magnesia | | | | 20 |
| carbonate | 20 | 22 | | 42 |
| muriate, cryst. 5 water | 20 | 37 | 45 | 102 |
| sulphate | 20 | 40 | | 60 |
| cryst. 7 water | 20 | 40 | 63 | 123 |
| sulphate of Soda and | 32+20 | 80 | | 132 |
| Mercury, protoxide | | | | 208 |
| peroxide | | | | 216 |
| acetate | 208 | 51 | | 259 |
| cryst. 4 water | 208 | 51 | 36 | 295 |
| nitrate | 208 | 54 | | 262 |
| cryst. 2 water | 208 | 54 | 18 | 280 |
| per-nitrate | 216 | 54 | | 270 |
| sub-nitrate | 432 | 54 | | 486 |
| sulphate | 208 | 40 | | 248 |
| cryst. 2 water | 208 | 40 | 18 | 266 |
| per-sulphate | 216 | 40 | | 256 |
| bi-persulphate | 216 | 80 | | 296 |
| cryst. 1 water | 216 | 80 | 9 | 305 |
| Potash | | | | 48 |
| acetate | 48 | 51 | | 99 |
| binacetate, cryst. 6 water | 48 | 102 | 54 | 204 |
| arseniate | 48 | 62 | | 110 |
| carbonate | 48 | 22 | | 70 |
| cryst. 2 water | 48 | 22 | 18 | 88 |
| bi-carbonate | 48 | 44 | | 92 |
| cryst. 1 water | 48 | 44 | 9 | 101 |
| chlorate | 48 | 76 | | 124 |
| chromate | 48 | 52 | | 100 |
| bi-chromate | 48 | 104 | | 152 |
| citrate | 48 | 58 | | 106 |
| hydriodate | 48 | 125 | | 173 |
| nitrate (nitre) | 48 | 54 | | 102 |
| oxalate | 48 | 36 | | 84 |
| cryst. 1 water | 48 | 36 | 9 | 93 |
| binoxalate | 48 | 72 | | 120 |
| cryst. 2 water | 48 | 72 | 18 | 138 |
| sulphate | 48 | 40 | | 88 |
| bi-sulphate | 48 | 80 | | 128 |
| cryst. 2 water | 48 | 80 | 18 | 146 |
| tartrate, cryst. 2 water | 48 | 66 | 18 | 132 |
| bi-tartrate, cryst. 2 water (cream of tartar) | 48 | 132 | 18 | 198 |
| Silver, protoxide | | | | 118 |
| nitrate | 118 | 54 | | 172 |
| Soda | | | | 32 |
| bi-borate (borax,) 8 water | 32 | 48 | 72 | 152 |
| carbonate (sub-carbonate) | 32 | 22 | | 54 |
| cryst. 10 water | 32 | 22 | 90 | 144 |
| bi-carbonate | 32 | 44 | | 76 |
| cryst. 1 water | 32 | 44 | 9 | 85 |
| sesquicarbonate, cryst. 2 water | 32 | 33 | 18 | 83 |
| phosphate | 32 | 28 | | 60 |
| cryst. 12 water | 32 | 28 | 108 | 168 |
| sulphate | 32 | 40 | | 72 |
| cryst. 10 water | 32 | 40 | 90 | 162 |

| TABLE I.—(*continued.*) | Base. | Acid. | Water 1 atom =9. | Equivalent of the Salts H.=1. |
|---|---|---|---|---|
| Soda, tartrate | 32 | 66 | | 98 |
| 2 water | 32 | 66 | 18 | 116 |
| tartrate of potash and, (Rochelle salt) 8 water | 32+48 | 132 | 72 | 284 |
| urate, 1 water | 32 | 72 | 9 | 113 |
| Zinc, oxide | | | | 42 |
| acetate | 42 | 51 | | 93 |
| cryst. 7 water | 42 | 51 | 63 | 156 |
| carbonate | 42 | 22 | | 64 |
| cryst. 1 water | 42 | 22 | 9 | 73 |
| muriate | 42 | 37 | | 79 |
| sulphate | 42 | 40 | | 82 |
| cryst. 7 water | 42 | 40 | 63 | 145 |

## Table II.—*Composition of Vegetable Acids.*

| Acid. | Carbon. | Oxygen. | Hydrogen. | Equivalent |
|---|---|---|---|---|
| Acetic Acid | 4 atoms=24 | 3 atoms=24 | 5 atoms=3 | 51 |
| Benzoic Acid | 15 atoms=90 | 3 atoms=24 | 6 atoms=6 | 120 |
| Citric Acid | 4 atoms=24 | 4 atoms=32 | 2 atoms=2 | 58 |
| Formic Acid | 2 atoms=12 | 3 atoms=24 | 1 atom =1 | 37 |
| Gallic Acid | 6 atoms=36 | 3 atoms=24 | 3 atoms=3 | 63 |
| Mallic Acid | 4 atoms=24 | 4 atoms=32 | 3 atoms=3 | 59 |
| Oxalic Acid | 2 atoms=12 | 3 atoms=24 | | 36 |
| Saccholactic Acid | 6 atoms=36 | 8 atoms=64 | 4 atoms=4 | 104 |
| Succinic Acid | 4 atoms=24 | 3 atoms=24 | 2 atoms=2 | 50 |
| Tartaric Acid | 4 atoms=24 | 5 atoms=40 | 2 atoms=2 | 66 |

## Table III.—*Composition of Vegetable Alkalis.*

| Vegetable Alkali. | Carbon. | Oxygen. | Hydrogen. | Nitrogen. | Equivalent. |
|---|---|---|---|---|---|
| Brucia | 75.04 | 11.21 | 6.52 | 7.22 | 412 ? |
| Cinchonia | 76.97 | 7.79 | 6.22 | 9.02 | 315 ? |
| Emetia | 64.57 | 22.95 | 7.77 | 4.3 | |
| Morphia | 72.02 | 14.84 | 7.01 | 5.53 | 322 ? |
| Quinia | 75 | 10.43 | 6.66 | 8.45 | 360 ? |
| Strychnia | 78.22 | 6.38 | 6.54 | 8.92 | 380 ? |
| Veratria | 66.75 | 19.6 | 8.54 | 5.04 | |

## Table IV.—*Vegetable Principles neither acid nor alkaline.*

| | Carbon. | Oxygen. | Hydrogen. | Equivalent |
|---|---|---|---|---|
| Sugar | 3 atoms=18 | 3 atoms=24 | 3 atoms= 3 | 45 |
| Starch | 6 —— =36 | 6 —— =48 | 6 —— = 6 | 90 |
| Gum | 6 —— =36 | 6 —— =48 | 6 —— = 6 | 90 |
| Lignin | 7 —— =42 | 4 —— =32 | 4 —— = 4 | 78 |
| Alcohol | 2 —— =12 | 1 —— = 8 | 3 —— = 3 | 23 |
| Ether | 4 —— =24 | 1 —— = 8 | 5 —— = 5 | 37 |
| Oil of Turpentine | 14 —— =84 | 1 —— = 8 | 10 —— =10 | 102 |
| Camphor | 10 —— =60 | 1 —— = 8 | 9 —— = 9 | 77 |
| Resin | 8 —— =48 | 1 —— = 8 | 7 —— = 7 | 63 |
| Fixed Oil | 10 —— =60 | 1 —— = 8 | 11 —— =11 | 79 |
| Wax | 13 —— =78 | 1 —— = 8 | 11 —— =11 | 97 |
| Tannin | 6 —— =36 | 4 —— =32 | 3 —— = 3 | 71 |

# TABULA MATERIÆ MEDICÆ.

## I. INORGANICA.

### Classis I. Sales.

#### Ordo Acida.

Acidum aceticum.
——— benzoicum.
——— carbonicum.
——— citricum.
——— muriaticum.
——— nitricum.
——— nitrosum.
——— nitromuriaticum.
——— phosphoricum.
——— prussicum.
——— succinicum.
——— sulphuricum.
——— tartaricum.

#### Ord. Alkalia.

Ammonia.
Potassa.
Soda.

#### Ord. Sales Neutri.

Ammoniæ acetas.
——— bicarbonas.
——— carbonas.
——— sesquicarbonas.
——— hydrosulphuretum.
——— murias.
Potassæ acetas.
——— bicarbonas.
——— carbonas.
——— hydriodas.
——— nitras.
——— sulphuretum.
——— sulphas.
——— bisulphas.
——— tartras.
——— bitartras.
——— et sodæ tartras.
Sodæ acetas.
——— boras.
——— bicarbonas.
——— carbonas.
——— murias.
——— phosphas.
——— sulphas.

### Cl. II. Terræ.

Alumen.
Barytæ carbonas.
——— murias.
——— sulphas.
Calx.
Calcis carbonas.
——— murias.
——— phosphas.
Magnesia.
Magnesiæ carbonas.
——— sulphas.

### Cl. III. Inflammabilia.

Sulphur.
Carbo.
Succinum.
Bitumen Petroleum.
Alcohol.
Æther sulphuricus.
——— nitricus.

### Cl. IV. Metalla.

Antimonii oxidum.
——— submurias.
——— sulphuretum.
——— tartras et potassæ.
Argentum.
Argenti nitras.
Arsenici oxidum album.
Bismuthum.
Bismuthi subnitras.
Cuprum.
Cupri acetas.
——— subacetas.
——— ammoniaretum.
——— sulphas.
Ferrum.
Ferri acetas.
——— carbonas.
——— carbonas et potassæ.
——— cyanuretum.
——— murias.
——— murias et ammoniæ.
——— oxidum nigrum.
——— oxidum rubrum.
——— sulphas.
——— sulphuretum.
——— tartras et potassæ.
Hydrargyrum.
Hydrargyri acetas.
——— cyanuretum.
——— murias corrosivus.
——— murias mitis.
——————— et ammoniæ.
——— nitras.
——— subnitras ruber.
——— oxidum cinereum.
——— oxidum rubrum.
——— persulphas.
——— subsulphas flavus.
——— sulphuretum nigrum.
——————— rubrum.
Manganesii oxidum.
Plumbum.
Plumbi acetas.
——— subacetas.
——— carbonas.
——— oxidum semivitreum.
Stannum.
Zincum.
Zinci acetas.
——— carbonas.
——— oxidum.
——— sulphas.

### Cl. V. Aquæ.

Aqua pura.

Aqua marina.
Aquæ minerales.

Cl. VI. Gasea.

Gas acidum carbonicum.
—— chlorinium.
—— hydrogenium carburetum.
—— oxidum nitrosum.
Electricitas—Galvanismus.

II. ORGANICA.

Vegetabilia.

Classes Linnæi. Ordines Naturales Jussieu.

Classis I. Monandria.

Ordo Monogynia.

Amomum repens } Cannæ.
——— Zingiber }

Cl. II. Diandria.

Ord. Monogynia.

Olea Europea Jasmineæ.
Gratiola officinalis Scrophulariæ.
Rosmarinus officinalis } Labiatæ.
Salvia officinalis }

Ord. Trigynia.

Piper cubeba }
—— longum } Piperitæ.
—— nigrum }

Cl. III. Triandria.

Ord. Monogynia.

Crocus sativus } Irideæ.
Iris Florentina }
Valeriana officinalis Valerianæ.

Ord. Digynia.

Avena sativa }
Hordeum distichum }
Saccharum officinarum } Gramineæ.
Triticum hybernum }

Cl. IV. Tetrandria.

Ord. Monogynia.

Dorstenia contrayerva Urticeæ.
Rubia tinctorum Rubiaceæ.
Krameria triandra Polygaleæ.

Cl. V. Pentandria.

Ord. Monogynia.

Anchusa tinctoria Boragineæ.
Atropa belladonna }
Capsicum annuum }
Datura stramonium }
Hyosciamus niger } Solaneæ.
Nicotiana tabacum }
Solanum dulcamara }
Verbascum thapsus }
Bonplandia trifoliata } Rutaceæ.
Diosma crenata }
Strychnos nux vomica Strychneæ.
Convolvulus jalapa } Convolvulaceæ.
——— scammonia }

Cinchona cordifolia }
——— lancifolia }
——— oblongifolia } Rubiaceæ.
Calicocca ipecacuanha }
Chironia centaureum }
Menyanthes trifoliata } Gentianeæ.
Spigelia Marilandica }
Rhamnus catharticus Rhamneae.

Ord. Digynia.

Anethum graveolens }
——— fœniculum }
Angelica archangelica }
Bubon galbanum }
Carum carui }
Conium maculatum }
Coriandrum sativum } Umbelliferæ.
Cuminum cyminum }
Daucus carota }
Ferula assafœtida }
Heracleum gummiferum }
Pastinaca opoponax }
Pimpinella anisum }
Ulmus campestris Urticeæ.
Gentiana lutea Gentianeæ.

Ord. Trigynia.

Rhus toxicodendron Terebinthaceæ.
Sambucus nigra Caprifoliaceæ.

Ord. Pentagynia.

Linum usitatissimum } Linaceæ.
——— catharticum }

Cl. VI. Hexandria.

Ord. Monogynia.

Allium sativum }
——— cepa }
——— porrum } Liliaceæ.
Aloë spicata }
—— vulgaris }
Scilla maritima }
Acorus calamus Aroideæ.

Ord. Trigynia.

Colchicum autumnale Colchicaceæ.
Rumex aquaticus } Polygoneæ.
——— acetosa }

Cl. VIII. Octandria.

Ord. Monogynia.

Amyris elemifera } Terebinthaceæ.
——— Gileadensis }
Daphne mezereum Thymeleæ.

Ord. Trigynia.

Polygonum bistorta Polygoneæ.

Cl. IX. Enneandria.

Ord. Monogynia.

Laurus cassia }
——— camphora }
——— cinnamomum } Laurineæ.
——— nobilis }
——— sassafras }

Ord. Trigynia.

| | |
|---|---|
| Rheum palmatum | Polygoneæ. |
| ——— undulatum | |
| ——— compactum | |

Cl. X. Decandria.

Ord. Monogynia.

| | |
|---|---|
| Cassia senna | Leguminosæ. |
| ——— fistula | |
| Copaifera officinalis | |
| Myroxylon Peruiferum | |
| ———— Toluiferum | |
| Hæmatoxylon Campechianum | |
| Guaicum officinale | Rutaceæ. |
| Quassia simaruba | |
| ——— excelsa | |
| Ruta graveolens | |
| Arbutus Uva-ursi | Ericineæ. |
| Pyrola umbellata | |
| Rhododendron chrysanthum | |
| Styrax officinale | Symploceæ. |
| ——— benzoin | |
| Swietenia febrifuga | Meliaceæ. |
| ———— mahogani | |
| Boswellia serrata | Terebinthaceæ. |

Ord. Digynia.

| | |
|---|---|
| Dianthus caryophyllus. | Caryophylleæ. |

Ord. Pentagynia.

| | |
|---|---|
| Oxalis Acetosella | Oxalideæ. |

Cl. XI. Dodecandria.

Ord. Monogynia.

| | |
|---|---|
| Asarum Europæum | Aristolochiæ. |
| Canella alba | Meliaceæ. |
| Lythrum salicaria | Salicariæ. |

Ord. Trigynia.

| | |
|---|---|
| Euphorbia officinarum | Euphorbiaceæ. |

Cl. XII. Icosandria.

Ord. Monogynia.

| | |
|---|---|
| Amygdalus communis | Rosaceæ. |
| ———— amara | |
| ———— Persica | |
| Prunus domestica | |
| ——— lauro-cerasus | |
| Eugenia caryophyllata | Myrtaceæ. |
| Myrtus pimenta | |
| Punica granatum | |

Ord. Polygynia.

| | |
|---|---|
| Geum urbanum | Rosaceæ. |
| Rosa canina | |
| —— centifolia | |
| —— Gallica | |
| Tormentilla erecta | |

Cl. XIII. Polyandria.

Ord. Monogynia.

| | |
|---|---|
| Papaver somniferum | Papaveraceæ. |
| ——— rhœas | |

Ord. Trigynia.

| | |
|---|---|
| Aconitum napellus | Ranunculaceæ. |
| Delphinium staphisagria | |

Ord. Tetragynia.

| | |
|---|---|
| Wintera aromatica | Magnoliaceæ. |
| Helleborus niger | Ranunculaceæ. |
| ———— fœtidus | |

Cl. XIV. Didynamia.

Ord. Gymnospermia.

| | |
|---|---|
| Hyssopus officinalis | Labiatæ. |
| Lavandula spica | |
| Mentha piperita | |
| ——— pulegium | |
| ——— viridis | |
| Marrubium vulgare | |
| Melissa officinalis | |
| Origanum vulgare | |
| ———— majorana | |

Ord. Angiospermia.

| | |
|---|---|
| Digitalis purpurea | Scrophulariæ. |
| Scrophularia nodosa | |

Cl. XV. Tetradynamia.

Ord. Siliquosæ.

| | |
|---|---|
| Cardamine pratensis | Cruciferæ. |
| Sinapis alba | |
| ——— nigra | |
| Sisymbrium nasturtium | |

Ord. Siliculosæ.

| | |
|---|---|
| Cochlearia armoracia | Cruciferæ. |
| ———— officinalis | |

Cl. XVI. Monadelphia.

Ord. Triandria.

| | |
|---|---|
| Tamarindus Indica | Leguminosæ. |

Ord. Polyandria.

| | |
|---|---|
| Althea officinalis | Malvaceæ. |
| Malva sylvestris | |

Cl. XVII. Diadelphia.

Ord. Octandria.

| | |
|---|---|
| Polygala senega | Polygaleæ. |

Ord. Decandria.

| | |
|---|---|
| Astragalus tragacantha | Leguminosæ. |
| Dolichos pruriens | |
| Geoffræa inermis | |
| Glycyrrhiza glabra | |
| Pterocarpus draco | |
| ———— erinacea | |
| ———— santalinus | |
| Spartium scoparium. | |

Cl. XVIII. Polyadelphia.

Ord. Icosandria.

| | |
|---|---|
| Citrus aurantium | Aurantiaceæ. |
| ——— medica | |
| Melaleuca cajuputi | Myrtaceæ. |

Cl. XIX. Syngenesia.

Ord. Polygamia æqualis.

| | |
|---|---|
| Arctium lappa | Compositæ Cynarocephalæ. |
| Lactuca sativa<br>——— virosa<br>Leontodon taraxacum | Compositæ Cichoraceæ. |

Ord. Polygamia Superflua.

| | |
|---|---|
| Anthemis nobilis. | |
| ——— pyrethrum<br>Arnica montana<br>Artemisia absinthium<br>——— Chinensis<br>——— santonica<br>Inula helenium<br>Tanacetum vulgare | Compositæ Corymbiferæ. |
| Tussilago farfara. | |

Ord. Polygamia Frustranea.

| | |
|---|---|
| Centaurea benedicta | Comp. Cynaroceph. |

Cl. XX. Gynandria.

Ord. Hexandria.

| | |
|---|---|
| Aristolochia serpentaria | Aristolochiæ. |

Cl. XXI. Monœcia.

Ord. Hexandria.

| | |
|---|---|
| Cocos butyracea | Palmæ. |

Ord. Polyandria.

| | |
|---|---|
| Quercus robur<br>——— infectoria | Cupuliferæ. |

Ord. Monadelphia.

| | |
|---|---|
| Pinus abies<br>——— balsamea<br>——— larix<br>——— sylvestris | Coniferæ. |
| Croton cascarilla<br>——— tiglium<br>Ricinus communis | Euphorbiaceæ. |

Ord. Syngenesia.

| | |
|---|---|
| Cucumis colocynthis<br>Momordica elaterium | Cucurbitaceæ. |

Cl. XXII. Diœcia.

Ord. Diandria.

| | |
|---|---|
| Salix alba<br>——— caprea<br>——— fragilis | Salicineæ. |

Ord. Pentandria.

| | |
|---|---|
| Humulus lupulus | Urticeæ. |
| Pistacia lentiscus<br>——— terebinthus | Terebinthaceæ. |

Ord. Hexandria.

| | |
|---|---|
| Smilax sarsaparilla | Asparagineæ. |

Ord. Dodecandria.

| | |
|---|---|
| Cocculus palmatus (Colomba)<br>——— suberosus | Menispermeæ. |

Ord. Monadelphia.

| | |
|---|---|
| Juniperus communis<br>——— sabina | Coniferæ. |
| Myristica moschata | Myristiceæ. |

Cl. XXIII. Polygamia.

Ord. Monœcia.

| | |
|---|---|
| Veratrum album | Colchicaceæ. |
| Stalagmitis cambogiodes | Guttiferæ. |
| Acacia Arabica<br>——— vera<br>——— catechu | Leguminosæ. |

Ord. Diœcia.

| | |
|---|---|
| Fraxinus ornus | Jasmineæ. |

Ord. Triœcia.

| | |
|---|---|
| Ficus carica | Urticeæ. |

Cl. XXIV. Cryptogamia.

Ord. Algæ.

Cetraria Islandica.

Ord. Filices.

Aspidium Filix mas.

ANIMALIA.

Classis Mammalia.

Adeps ovillus.
——— suillus.
Castoreum.
Cetaceum.
Cornu cervi.

Cl. Pisces.

Ichthyocolla.

Cl. Insecta.

Cantharis vesicatoria.
Cera Mel.
Chelæ et lapilli cancrorum.

Cl. Zoophyta.

Spongia.

# PART I.

## OF MATERIA MEDICA.

Materia Medica, in the extensive signification which has been attached to the term, comprises the history both of Aliments and of Medicines. It is used, however, more frequently and more correctly, as opposed to the Materia Alimentaria; and in this limited sense may be defined—that department of Medicine, which describes the properties, and investigates the effects on the living system, of those substances which are employed as remedies against disease. It includes the history of these substances, independent of the preparations to which they are subjected to fit them for administration, these belonging to the department of Pharmacy.

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## CHAP. I.

### OF THE CLASSIFICATION OF THE ARTICLES OF THE MATERIA MEDICA.

The classification of medicines has been attempted on two different principles; their Natural History, and what may be more strictly denominated their Medical History, have each been made the basis of a system of arrangement. Of these the latter seems to merit preference.

The Natural History of remedies is of indispensable utility in enabling us to distinguish them with accuracy and to recognize them. Farther, the natural affinities which may be traced between bodies not unfrequently throw much light on their medicinal agency. In the vegetable kingdom especially, these affinities have been traced and applied with much advantage. Those vegetables which agree in their general structure, habit and appearances, are thrown into what are named Natural Orders or Families; and experience has shewn that the individuals composing many of these natural orders have a remarkable similarity in their medicinal effects. In not a few instances naturalists have been led by these analogies to just conclusions respecting the virtues of plants; and in studying the vegetable part of the Materia Medica, attention is undoubtedly due to

such affinities. But as a basis of classification there is too much uncertainty and obscurity in the natural history of remedies for it to admit of extensive and accurate application. The medicinal actions of plants of the same order are sometimes totally different; nay, different parts of the same plant have frequently opposite powers. And in the other classes of remedies, as the saline and metallic, natural history furnishes no principle of arrangement.

An arrangement of the articles of the Materia Medica, in conformity to their medical history, appears more systematic and more conformable to the objects of the study itself. These substances are subjects of inquiry, from being possessed of certain medicinal powers, which ought therefore to be the basis of their arrangement. And if substances are classed on a principle of this kind, there are the advantages, that by associating together remedies possessed of similar virtues, it becomes easier to compare them with each other, to deliver the theory of their common action, and to point out the peculiarities which may attend the operation of each. It is true, that an arrangement of this nature involves some degree of repetition. A substance is frequently capable of producing several different medicinal effects; for example, it may be capable of acting as an emetic, as a cathartic, and as a diuretic; and as we are unable, in the present state of our knowledge of the animal economy, to determine whether these are modifications of one action, it is necessary to consider every such remedy under each of these classes, and under each of them its history is incomplete. But this disadvantage is one of very little importance, and belongs to the subject rather than to the arrangement.

So far it appears sufficiently obvious that a scientific arrangement of the substances used in medicine can be formed only from a consideration of their medicinal powers, but to carry this method into execution is a task of not a little difficulty. The action of substances on the living system is involved in such obscurity, that in endeavouring to class them according to these effects, we are obliged to admit of many deviations, and must be guided not unfrequently by imperfect analogies.

The difficulty of constructing a classification of medicines from their operations will be apparent from the failure even of Cullen when he attempted its execution, for there can be little hesitation in affirming, that the one he has given rests on principles nearly altogether false. The following table exhibits this classification :

MEDICAMENTA AGUNT IN

- SOLIDA.
  - Simplicia.
    - *Astringentia.*
    - *Tonica.*
    - *Emollientia.*
    - *Erodentia.*
  - Viva.
    - *Stimulantia.*
    - *Sedantia.*
      - *Narcotica.*
      - *Refrigerantia.*
    - *Antispasmodica.*
- FLUIDA.
  - Immutantia.
    - Fluiditatem.
      - *Attenuantia.*
      - *Inspissantia.*
    - Misturam.
      - Acrimoniam corrigentia.
        - In genere.
          - *Demulcentia.*
        - In specie.
          - *Antacida.*
          - *Antalkalina.*
          - *Antiseptica.*
  - Evacuantia.
    - *Errhina.*
    - *Sialagoga.*
    - *Expectorantia.*
    - *Emetica.*
    - *Cathartica.*
    - *Diuretica.*
    - *Diaphoretica.*
    - *Menagoga.*

Now, without examining it minutely, it may be remarked, that the basis of this classification, the assumption that some medicines act exclusively on the fluids of the body, is incorrect; for, with the exception of two or three classes, the action of the whole is on the living solids. Emetics, cathartics, diuretics, diaphoretics, emmenagogues, expectorants, sialagogues, and errhines, which Cullen has placed as medicines acting on the fluids, produce their effects, unquestionably by no operation on the fluids which they evacuate, but by exciting particular organs to action. The distinction is equally nugatory, in the greater number of cases, between the action of medicines on the simple solids and on the living solids. It cannot be doubted but that tonics produce their effects in removing debility, not, as the classification of Cullen assumes, by any action on the inanimate fibre of the body, giving it density or tone, but by their operation on the vital powers of the system. Nor can the effects of astringents be ascribed entirely to their corrugating quality.

In this arrangement, too, are placed classes of medicines which

have probably no existence, the action ascribed to them being merely hypothetical. We may be allowed to question the existence of attenuants and inspissants,—medicines which render the fluids of the body more thin, or which produce the opposite effect. Nor is there any reason to believe in the reality of antiseptics. The process of putrefaction probably never takes place in the living body; and, if it did, we know of no specific medicines by which it could be retarded or counteracted.

In the system of Brown, advanced in opposition to that of Cullen, more just views were unquestionably given of the relations of external agents to the living system, and of the laws regulating their action. The operations of medicines, however, are even in this system imperfectly explained, partly from the imperfect state of the science, and partly from its author having surveyed his subject with those views of generalization which preclude minute distinctions. Medicines he supposed to operate merely as other external agents by exciting to action either the general system, or the particular organs on which they operate; and to differ from each other in little more than in the degree in which they exert this stimulating power. They have, farther than this, no specific properties, but are adapted to the removal of morbid affections, by producing excitement, partial or general, with certain degrees of rapidity or force.

This proposition is far from being just, at least in an unlimited sense. Medicines, and even external agents in general, unquestionably differ, not only in degree, but in kind of action. Every substance applied to the organs of sense gives a different sensation, not referable to the mere force of the impression, but which must be attributed to some essential varieties in the modes of action of the agents themselves. Every organ is excited to its usual or healthy action only by its appropriate stimulant. It is the same with regard to medicines, differences in the kind of action they exert being not less conspicuous. Opium and mercury both excite the actions of the system, and so far they agree in their general operation. But the ultimate effects they produce are extremely dissimilar, nor from either of them can we, by any variation of dose, or mode of administration, obtain those effects which usually result from the action of the other. All the important articles nearly of the Materia Medica might be brought forward as similar examples, and as proving that they are not to be regarded simply as stimulants varying in strength, but that their action is modified by the peculiar powers they exert.

Still the principles of this system approach to the truth, and appear most conformable to the laws which regulate the animal economy, and, with some modifications, they may be applied so as to afford a more satisfactory view of the operations of medicines, as well as a basis for arranging them under different classes.

The general operation of medicines is that of exciting to action, either the whole system, or particular organs. This is the primary effect: and to express the agency of the substance producing it, the term of stimulant operation may be employed. And, according to

the kind and degree of this, different effects are produced, the discrimination of which may afford several important distinctions.

Thus, of those stimulants which act on the general system, the operation is extremely different with regard to diffusibility and permanence. Some are highly diffusible in their action, or, soon after they have been received into the stomach, they produce increased vigour, which is immediately conspicuous in the force of the circulation, the nervous system, or the different functions of the body; while, with regard to others, the same general effect is produced more slowly, and is scarcely perceptible but from their repeated or continued administration. Those which are diffusible are at the same time usually transient in their operation; while those which produce excitement more slowly are generally more permanent. And by both diversities of action, it is obvious their operation must be productive of very different effects: the high excitement produced by the one is soon followed by proportional languor; the gradual excitement from the other being reduced more slowly, they occasion no such sudden changes, but are fitted to produce more lasting effects. These varieties of action serve, accordingly, to explain the differences in the power of some of our most important medicines, and they afford the distinction of two principal classes, Narcotics and Tonics; the one, so far as their action is understood, being apparently general stimulants, diffusible and transient, the other slow and permanent.

Another important difference among stimulants is derived from the action of some being general with regard to the system, while that of others is more peculiarly directed to particular organs. The effect with regard to either is not easily explained; but the fact is certain, that some substances, as soon as they are received into the stomach, not only produce on it a stimulant effect, but extend this to the general system; while there are others which, without any very evident action on the stomach, and still less, without any general action, excite particular organs; some, for example, stimulating the intestinal canal, others exciting the action of the secreting vessels of the kidneys, others operating on the exhalant vessels of the skin. These afford the distinctions of cathartics, diuretics, and diaphoretics, and there are other classes founded on similar local operations.

When medicines are thus determined to particular parts, they are either directly conveyed, by being received into the blood, or their action is communicated indirectly from the stomach, by the medium of the nervous system; and in both ways important local effects are produced.

Thus, there are many substances which appear to be capable of being so far assimilated with the food, as to enter into the composition of the chyle, and are received into the circulating mass. Being brought, in the course of the circulation, to particular organs, they often excite in them peculiar actions. Mercury affords an example of this. It enters the circulation, and, when accumulated to a sufficient extent, generally acts on the salivary glands. It is on secreting organs that these local effects are usually produced, and

frequently the substance is separated with the secreted fluid, so as to act on the secreting vessels. Such is the case with the alkaline salts, or with nitre, which are secreted by the vessels of the kidneys, stimulate them at the same time to increased action, and are capable of being detected in the urine by chemical tests.

But the most general mode in which the operation of medicines taken into the stomach is extended, either to the system in general, or to any particular organ, is by the medium of nervous communication. An impression is made on the fibres of the stomach by the substance received into it; and however difficult it may be to conceive the mode in which this can be communicated by the nerves to distant parts, the fact is established by sufficient evidence. It is evident from the effects of these substances being produced in a shorter time after they have been received into the stomach, than they could be were they to act by being absorbed by the chyle into the circulating mass. The stimulus of wine or of opium received into the stomach will instantly remove lassitude, and increase the vigour of the circulation, or of muscular exertion; or the same substances, in a larger dose, will, with the same celerity, depress all the functions, and exhaust the powers of life. Digitalis given to sufficient extent will speedily reduce, to a great degree, the frequency of the pulse; or a large dose of cinchona, given half an hour before the expected recurrence of the paroxysm of an intermittent, will prevent its attack. It has also been proved by experiment, that this communication of action from the stomach to other parts, in a number of cases, does not take place where the brain and spinal marrow have been destroyed, though the heart and vascular system have been preserved uninjured.

From this susceptibility of impression, and of communicating action to other parts, the stomach becomes an organ of the first importance, since, independent of its being the vehicle by which substances are conveyed into the blood, it is that by means of which medicines are brought to act on the system by the medium of the nerves. It sometimes happens, however, that a similar extension of action may take place from other parts; and hence effects may be obtained from medicines, by applying them to the surface of the body, similar to those which they produce when they have been received into the stomach. Sometimes the effect is conveyed by nervous communication, and sometimes the substance applied is absorbed by the lymphatics, and enters the blood. Examples of the first are to be found in many narcotics. Opium, applied to the skin, either in the solid form, or in that of tincture, often relieves pain, and removes spasmodic affections either general or local. Tobacco, applied to the region of the stomach, excites vomiting; and garlic applied to the feet acts as a powerful stimulant, and raises the strength of the pulse. Examples of the second mode of operation are still more frequent. Friction on the surface is a common method of introducing mercury into the circulating mass. By the same means oxide of arsenic, tartrate of antimony, and other active substances, may be introduced; a solution of them in water being rubbed on the palms of the hand; and, under certain circumstances,

this is preferable to their administration by the stomach. Many substances applied to a wound produce important effects on the system, affecting the functions of the heart or brain: in such cases they appear to act by entering the circulation through the divided veins of the part to which they are applied.

These are examples of the various relations which medicines bear to the living system. We are unable to assign a cause for these peculiar properties, to ascertain why the action of some should be extended to the system in general, or why that of others should be determined to particular parts, either where substances enter the blood, or where they act by the medium of the nerves. But from the possession of such properties, it is evident, that their powers as medicines must be more diversified than if they were merely general stimulants, varying in the degree of their stimulating power; and farther, that distinctions are thus afforded for establishing a variety of classes.

Another cause remains to be pointed out, by which the actions of medicines are diversified. Besides acting as stimulants, they sometimes occasion changes, either mechanical or chemical, in the state of the fluids, or of the simple solids, and these changes are productive of medicinal effects.

This operation of medicines was formerly supposed to be more extensive than it really is. Sufficient weight was not allowed to the important fact, that the actions of external agents on the living body are governed by laws different from those which regulate the actions exerted between the masses or particles of inanimate matter. Hence we find, in medical speculations, constant attempts to trace the causes of diseases to changes merely mechanical or chemical, to plethora or obstruction, to laxity or rigidity, to the abundance of acid or alkali, or to the presence of other specific acrimonies still less defined. The explanations of the operations of medicines were of course founded on these notions, and hence the distinctions of inspissants, attenuants, antacids, antalkalis, antiseptics, and several others with which the Materia Medica was loaded.

These errors are now nearly exploded. We have learned to consider the living system as endowed with peculiar properties and modes of action, incapable of being explained on mere mechanical or chemical principles; and to regard external powers acting upon it as producing changes conformable to these peculiar properties of life. Yet still we can sometimes refer a salutary change, either general or partial, to changes mechanical or chemical in the solids or fluids. Thus, symptoms arising from irritation may be removed by lubricating the irritated surface; acid in the stomach may be corrected by the exhibition of alkalis or absorbent earths; and urinary concretions may be dissolved, or at least their increase may be prevented, by the use of alkaline remedies. These properties of certain medicines are not perhaps highly important; but they demand attention, and they afford sufficient distinctions for the formation of several classes.

In conformity to these views, the following classification of the articles of the Materia Medica, founded on their medicinal opera-

tions, may be established. It is only necessary to observe, principally to obviate hasty criticism, that, in classifications founded on this principle, perfect precision is not to be expected. The science of medicine is still in so imperfect a state, particularly in what regards the relations of external agents to the living body, that both in arranging the classes, and associating the substances which we place under each, we must frequently rest satisfied with remote analogies, which will not always bear a strict examination. This is an imperfection at present unavoidable; it must either be submitted to, or such modes of classification must be altogether rejected; and the question therefore ultimately is, not whether these arrangements are unobjectionable, but whether the advantages belonging to them are not such as to justify their adoption even with their imperfections.

Under the first division of the arrangement I propose, may be placed those substances which exert a general stimulant operation on the system. Of these there are two subdivisions, the Diffusible and the Permanent; the former including the class of Narcotics, with which may be associated, as not very remote in their operation, the class of Antispasmodics; the latter comprising two classes, Tonics and Astringents. Through these there is a gradual transition from the more highly diffusible stimulants, to those more slow and durable in their action.

A second division comprehends Local Stimulants,—those, the action of which is determined to particular parts of the system. Such are the classes of Emetics, Cathartics, Emmenagogues, Diuretics, Diaphoretics, Expectorants, and Sialagogues; with which may be associated the classes of Errhines and of Epispastics, founded on direct local application.

The remaining classes include substances which do not operate according to laws peculiar to the living system. To one division may be referred those, the effects of which depend on the chemical changes they produce in the fluids or solids: the classes which may be established on this principle are Refrigerants, Antacids, Lithontriptics, and Escharotics. To another division belong those, the operation of which is purely mechanical, Diluents, Demulcents, Emollients, and Anthelmintics.

Under these classes may be comprehended all those substances which are capable of producing salutary changes in the human system, and which are used as remedies. A view of this classification is exhibited in the following table:

## TABLE OF CLASSIFICATION.

| | | |
|---|---|---|
| A. General Stimulants. | | |
| | a. Diffusible. | Narcotics. |
| | | Antispasmodics. |
| | b. Permanent. | Tonics. |
| | | Astringents. |
| B. Local Stimulants. | | Emetics. |
| | | Cathartics. |
| | | Emmenagogues. |
| | | Diuretics. |
| | | Diaphoretics. |
| | | Expectorants. |
| | | Sialagogues. |
| | | Errhines. |
| | | Epispastics. |
| C. Chemical Remedies. | | Escharotics. |
| | | Antacids. |
| | | Lithontriptics. |
| | | Refrigerants. |
| D. Mechanical Remedies. | | Diluents. |
| | | Demulcents. |
| | | Emollients. |
| | | Anthelmintics. |

From this arrangement some classes are excluded that have usually found a place in others; but these have either appeared to me to be not essentially different from those that are admitted, or to have been founded on false or hypothetical distinctions.

## ADDITIONAL OBSERVATIONS

### ON THE OPERATION OF MEDICINES.

(BY THE AMERICAN EDITOR.)

[There are at present two theories more especially prevalent in this country concerning the modus operandi of medicines. The first asserts that all medicinal substances act primarily and exclusively upon the solids of the body, and that all the consequent impressions made upon distant parts of the system are the result of *sympathy*. This theory of course rejects entirely the fluids as having any immediate concern in the operation of medicines, and even denies as a matter of fact that foreign substances of any kind ever enter into the living circulation. The second, while it admits the existence of such a principle or property as sympathy, by whose agency the operation of a certain portion of medicines can alone be explained, contends at the same time that other medicines act directly upon the fluids, are absorbed into the circulation, and produce effects upon the system at

large as well as upon particular organs through the medium of the blood. Among the advocates of the former of these theories is professor Chapman of Philadelphia, who, it must be admitted, has displayed abundance of zeal, if not of judgment, in its support. As his work on Materia Medica and Therapeutics may be considered as embodying the whole strength of the supporters of this doctrine, I shall take the liberty of examining some of the principal arguments upon which its defence is rested. In announcing his views on this subject, Doctor Chapman asserts that "all medicines act by exciting a local impression, which is extended through the medium of sympathy."—vol. i. p. 60. 2d Ed. As a corollary from this position, he denies that any substances ever enter the circulation. "It must be acknowledged," says he, "that no substance, in its active state, does reach the circulation, since it is shown, that a small portion even of the mildest fluid, as milk or mucilage, oil or pus, cannot be injected into the blood-vessels without occasioning the most fatal consequences."—vol i. p. 64. A prominent argument in support of this opinion, and one which seems to be dwelt upon with considerable complacency, is, "that chyle, however diversified the materials may be out of which it is formed, whether animal or vegetable, has essentially an identity of nature." This "fact of the perfect and uniform constitution of chyle seems, at once," it is said, "to put down the hypothesis," that any crude substances are ever taken into the circulation. Now, against this argument the following objections may be urged: It does not appear, in the first place, to be really the fact, that chyle, whether formed from animal or vegetable food, possesses this "perfect uniformity and identity of constitution" for which Dr. Chapman contends. So far from this, the very reverse has been completely established by actual experiment. Dr. Marcet, in his analysis of chyle,* states that the chyle from vegetable food yields about three times as much charcoal as that from animal food; that the chyle from animal food generally begins to putrefy in three or four days, whilst that from vegetable food can be kept for weeks, or even months, without undergoing putrefaction; that the chyle from animal food is always milky, and, on standing, an unctuous white creamy substance collects on the surface; its coagulum is opaque, and has a pink hue; the chyle from vegetable food is commonly transparent, or nearly so, like common serum; its coagulum is nearly colourless, like an oyster, and no creamy substance rises to the surface. This statement certainly exhibits several very striking points of difference between the chyle formed from animal food and that formed from vegetables; and it unquestionably does away the broad position concerning the "perfect uniformity" of chyle. Should Dr. Chapman endeavour to shield himself from the force of this representation, by urging that the difference pointed out in the analysis of Dr. Marcet is merely a variation in the proportions of the same elementary ingredients, his own work may be referred to for a summary refutation of such a suggestion, when he tells us, "that experiments have fully demonstrated, that articles widely discrepant in

* Medico-Chirurgical Transactions, vol. vi. p. 630.

their general nature, as aliment and medicines, the most salutary food and the rankest poison, exhibit on analysis nearly the same results. This indeed holds so generally true, that the virus of the viper, and the mildest mucilage, the poisonous prussic acid, and the nutritive flesh of animals, constitute no exception. Decomposed into their elementary principles, they are essentially the same."—vol. i. p. 42. If, therefore, a variation in the proportions and combinations of its elementary ingredients does not constitute a real difference in the chyle, then it follows from Dr. Chapman's own showing, that there is no difference between "aliments and medicines"—between "the most salutary food and the rankest poison"—between "the virus of the viper and the mildest mucilage"—or between "the poisonous prussic acid and the nutritive flesh of animals."

A second objection to this doctrine of the "perfect and uniform identity" of chyle, is, that it is positively contradicted by facts too well attested to be set aside. By Musgrave, Fordyce, and others, it has long since been shown, that certain articles, taken into the stomach with the food, will impart their peculiar colour to the chyle, and must therefore have become incorporated with it. By Dr. Chapman this is denied, on the ground of experiments made by himself and others, in the University of Pennsylvania, although he appears not to be borne out in his conclusions, even by his own statement. "None of the preparations of iron," he tells us, "of copper, of lead, nor the colouring matter of indigo, of madder, or of rhubarb, can be traced even as far as the chyle. Being introduced into the small intestines of dogs, *these several articles were observed to be rapidly taken up by the lacteals*, the coloured ones losing their tints on passing on, and, in every instance, so completely were their properties obliterated, as not at all to be cognizable by any chemical tests in the contents of the thoracic duct."—vol. i. p. 68.

Dr. Chapman will not pretend that the lacteals contain any other fluid than the *chyle*, and if so, he upsets his whole argument by the admissions which he makes in the paragraph just quoted. The fact that the chyle, when it reached the thoracic duct, had lost the colour imparted to it by the various substances mentioned in these experiments, may be explained in a very simple and satisfactory manner, by recollecting that as the indigo or the madder passed on from the lacteals to the thoracic duct, it became successively diffused through a larger quantity of chyle, and therefore it was a very obvious and necessary consequence that the colour communicated to the chyle should become constantly fainter, until finally it was completely lost. A satisfactory illustration is at the command of every person. By dissolving a portion of indigo in a small quantity of milk or water, it will be found to give to these fluids a very deep tinge. By adding successively, however, of the milk or water, the colour will gradually fade, until at last it will be scarcely perceptible. Precisely in this way is the fact mentioned by Dr. Chapman to be explained.

A *second* argument of Dr. Chapman's against the doctrine that medicinal substances are taken into the circulation, is, that if such were the case, it would be attended with the most fatal effects upon the system, inasmuch as the mildest fluids cannot be injected into the

blood-vessels without destroying life. That his reasoning may be perfectly understood, I shall quote his own language: "It must be acknowledged," says he, "that no substance, in its active state, does reach the circulation, since it is shown, that a small portion even of the mildest fluid, as milk or mucilage, oil or pus, cannot be injected into the blood-vessels without occasioning the most fatal consequences. Twenty-two years ago, in conjunction with my friend, the late Dr. George Lee, then resident in the Pennsylvania Hospital, I instituted a series of experiments to this purpose. All the articles enumerated above were tried in succession, together with some others of an acrid and stimulating nature, on dogs and cats, the animals selected on the occasion. But, diversified as these substances are, we could discern no material difference in their effects, the whole seeming to act merely as extraneous matter in *error loci*, producing, at first, great distress to the animal, as was indicated by its movements and cries, followed by difficult panting, respiration, vomiting, and purging, nervous tremors, convulsions, and death. Experiments very analogous to the preceding have recently, I understand, been made by Professor Caldwell, and with confirmatory results. That the late inquiries of Sir Everard Home and others lead to a different conclusion, I am aware. Confiding, however, in the accuracy of our own observations, I must, in the present state of the question, still maintain, without the slightest qualification, the position I have assumed."—vol. i. p. 64, 65.

Before proceeding to the examination of this argument, I cannot help expressing my regret that the experiments to which Dr. Chapman alludes as having been performed in Philadelphia, should differ so widely from those conducted in other parts of the world, because it serves not merely to shake the confidence hitherto reposed in men who have been universally esteemed as able and accurate experimentalists, but also to weaken the faith which might otherwise have been put in the accuracy of the experiments of Dr. Chapman himself. For assuredly, if Home, Majendie, and others, who have devoted themselves to these investigations, are not to be depended upon, it cannot be considered as very presumptuous to cherish a little scepticism concerning the infallibility of Dr. Chapman and his associates. Without intending, however, to impeach in the least the correctness of the experiments of these gentlemen, it is impossible to get rid of the mass of opposite testimony, recorded on authority too respectable to be despised. Independent of those reported by Home and Majendie, there are many other facts to prove, that medicines introduced into the blood-vessels may prove not merely innocuous, but even salutary. By referring to some of the early volumes of the Transactions of the Royal Society in London, several cases will be found recorded, in which patients were cured by medicines thus introduced into the system. Admitting, however, for the sake of argument, the objection of Dr. Chapman to its fullest extent, it by no means proves the doctrine for which he contends. Supposing that medicinal substances, when injected into the blood-vessels, do produce such deleterious effects, it does not seem of necessity to follow, that similar consequences should result from them, when introduced

into the circulation through the medium of the stomach and lacteals. On the contrary, the difference in the two modes of introduction seems so great as really to destroy all analogy between them. In proof of this, it needs only to be mentioned, that the chyle, the natural fluid circulating through the lacteals, will, if injected into any of the blood-vessels, produce effects precisely similar, and equally injurious with any of the foreign substances alluded to by Dr. Chapman. Hence the conclusion is inevitable, that substances may pass innocently into the system through *the lacteals*, which would be succeeded by the most deleterious consequences if introduced directly into *the blood*; and if so, Dr. Chapman's argument falls at once to the ground. It were easy to enlarge, for the purpose of showing how wide a difference there is in the *manner* in which substances enter the circulation in the two cases, but this must be so obvious to every person of reflection, that it is unnecessary to add any thing further on the subject.

A *third* objection of Dr. Chapman is couched in the following language: "Conceding, however, to the humoral pathologists all that their doctrine demands, still *insuperable difficulties* remain in the way of its adoption, to account for the operation of medicines. Not to dwell tediously on the subject, I shall content myself at present with little more than mentioning, that we are not at all informed by it why our remedies, after mixing with the blood, should be directed to one organ in preference to another, as mercury to the salivary glands, or how indeed they operate at all."—vol. i. p. 65. It is impossible to conjecture what Dr. Chapman gains by this objection, for it applies with quite as much force to his own theory. He tells us, indeed, that medicines are directed to particular parts of the system "through the medium of sympathy;" at the same time confessing that "of the *manner* in which impressions are extended, as well as of the *cause* of the more intimate consent of parts, we are not, perhaps, accurately informed." If, therefore, Dr. Chapman's own theory is confessedly inadequate to the explanation of this phenomenon, I have yet to learn by what rule of sound logic he is justified in raising this objection against another theory.

After all I cannot see any of those "insuperable difficulties," in explaining this subject, which appear to weigh so much upon the mind of Dr. Chapman. That every organ in the body has its peculiar and appropriate stimulus, by which it is excited into action, is so universally admitted as to require no process of reasoning to establish it. Dr. Chapman himself concedes it, and indeed it forms the basis of his classification. Hence it follows that certain medicines, when introduced into the system, act upon particular organs, leaving the rest more or less unaffected. If this be so, then there can be little difficulty in conceiving that a substance dissolved in the blood may circulate through the system, without producing any particular effects, until it reaches the organs upon which, from its peculiar properties, it is designed to operate. The reason *why* a medicine acts upon one organ, in preference to all the other organs of the body, why jalap, for instance, operates upon the intestines and not upon the brain and lungs, we can no more explain than we can the reason *why*

the planets are kept revolving in their orbits. If we are told that the movements of the planets are the result of attraction, so we may say that the determination of medicines to certain organs is occasioned by a similar kind of attraction. This, however, explains nothing, and we must after all be content with the broad *fact*, that such phenomena do occur, and that they are governed by certain laws; but the *cause why* they occur must ever remain concealed. Upon this ground Dr. Chapman is certainly asking too much to require that the cause should be assigned "*why* remedies, after mixing with the blood, should be directed to one organ in preference to another." All that the most rigid disputant can reasonably demand or expect is, that it should be proved, in the first place, that medicines are actually taken up into the circulation; and in the second place, that they afterwards act upon particular parts of the system. The latter is admitted on all hands, and the former rests on proofs too solid to be shaken.

A *fourth* objection is, that "by the *medication* of the blood, were it possible, as is contended for, we must in all instances do harm. The whole mass of circulating fluids is equally charged in this case with the medicinal substance, and therefore, while an action is going on in a diseased organ, which may be salutary as to it, every sound part of the system becomes subjected to a similar impression, which could not fail to disturb the order of health, and create morbid derangements."—vol. i. p. 65, 66.

All this is purely hypothetical. It is founded on a supposition entirely erroneous, which is, that a medicine cannot act upon one part of the system to the exclusion of the rest. In what has already been urged, I have in fact so fully replied to this argument, that it is unnecessary to enter into any recapitulation.

I have thus considered all the material objections of Dr. Chapman against what he chooses to call "a relick of the humoral pathology." Aware of the strong support which this "relick" receives from indisputable facts, he endeavours to explain them away in a manner equally singular and original. That we may have before us the full scope of his reasoning on this point I shall quote him at length. "That some of the properties of certain articles are displayed," says he, "in the secretions and excretions, I am not disposed to deny. But it does not hence follow that these substances entered the circulation in the primitive state. Directly the reverse, indeed, seems to be proved, as no one of them can be detected in the serum of the blood. To me it is clear, that the process of assimilation, as performed either by the chylopoietic viscera, or by any part of the absorbent apparatus, completely *decomposes* all substances; and, however discrepant in their properties, reduces them to a homogeneous fluid fitted for the purpose of nutrition. But when thrown into the secretions or excretions, being removed beyond the control of the vital energies, chemical affinities are sometimes again brought into play, by which these substances are in part or wholly regenerated. No slender support is given to this hypothesis by the well-known fact, that matters are found in such persons, which had not previously existed, in any cognizable state, in the blood. Thus, cer-

tain articles can only be detected in certain fluids, as the odour of garlic in milk, of asparagus in urine, of sulphur in the perspiration, and the colouring principle of madder is to be traced in no part of the solids, except the bones, and their immediate appendages, the cartilages. Did these articles pre-exist in the blood, instead of being regenerated in some such manner as I stated, ought they not to be thrown out indiscriminately by all the emunctories ?"—vol. i. p. 63, 64.

The most sturdy of the humoral pathologists could not wish Dr. Chapman to concede more than he has actually done in the foregoing paragraph. He admits that certain substances are carried into the circulation, and that they display their peculiar properties in the secretions and excretions. But, says he, they do not enter the circulation "in their primitive state;" they are reduced by the "process of assimilation," and thus enter into the circulation, and when thrown into the secretions and excretions, by the "play of chemical affinities, they are again, wholly or in part, regenerated." Let us analyse this explanation, and see what it amounts to. We are told that sulphur, taken internally, exhibits itself in the perspiration. According to Dr. Chapman's solution of this fact, the sulphur, before it is taken into the circulation, is reduced in some way so as to deprive it of all its characteristic properties, and when thrown out upon the skin by the "play of chemical affinities," is again regenerated and exhibited in the form of sulphur. To this explanation, objections of so strong and obvious a character present themselves, as to render it wholly inadmissible. We know nothing of sulphur, but as a *simple* substance, and Dr. Chapman ought to prove that it is *capable* of decomposition, before his explanation will hold good. Let us take another illustration. Nitrate of silver, taken internally, frequently produces permanent discolouration of the skin. Cases of this kind are on record,* and it is presumed will not be disputed. Dr. Chapman would argue, that the nitrate of silver is first decomposed into its elementary ingredients, and afterwards regenerated on the surface. The nitrate of silver then would be decomposed into nitric acid and an oxide of silver ; the nitric acid again would then be decomposed into oxygen and azote ; and the oxide of silver into oxygen and the pure metal. Further than this it is impossible to decompose them. Here, then, according to Dr. Chapman's own explanation, we have silver, a large quantity of oxygen, and azote, which must all enter into the blood in their separate and uncompounded state, or else it is impossible for the nitrate of silver to be formed afterwards upon the surface. It is evident, that this solution multiplies the difficulties which it was intended to remove. According to it, instead of *one*, we have actually *three* foreign substances entering into the blood. Dr. Chapman certainly could not have been aware of the consequences of his own doctrine, or he never would have urged it so boldly. Again ; the colouring principle of madder, which is found in the bones, Dr. Chapman tells us is decomposed by the chylopoietic viscera, and again regenerated in the places where

* See Medico-Chirurgical Transactions of London.

it is detected. Now, before this is admitted, it must be proved that this colouring principle is capable of being decomposed. This would be rather a difficult undertaking. Admitting, however, that it might be decomposed, it would be no less difficult to show that it could afterwards be regenerated. Vegetables undergo *destructive* decomposition, and can never be regenerated by the art of the chemist, or by any play of chemical affinities. In every point of view, therefore, the explanation of Dr. Chapman is wholly inadmissible ; being inconsistent with itself, and contradictory to known and acknowledged principles.

But, says Dr. Chapman, "did these articles pre-exist in the blood, instead of being regenerated in some such manner as I have stated, ought they not to be thrown out indiscriminately by all the emunctories ?" I answer no. Such a consequence no more follows than that all the glands of the system should secrete precisely the same kind of fluid. With just as much propriety might it be asked, why the liver does not secrete milk, or why the stomach does not secrete urine. The truth is, every secreting organ is destined to separate from the blood a *peculiar* substance, and hence it is perfectly plain why foreign matters, circulating in the blood, are not "thrown out indiscriminately upon all the emunctories."

Having given his objections to the doctrine that medicines ever enter the circulation, Dr. Chapman proceeds to explain his own theory of the *modus operandi* of medicines.

"It results, on the whole, from what I have said, that we are to reject the fluids altogether in our inquiries relative to the operations of medicines : because, in addition to the reasons already stated for doing so, we have in that law of the animal economy, termed sympathy, or consent of parts, a solution of the problem, which comports infinitely better with the existing state of our knowledge.

"Conformably to the theory I have adopted, whenever a medicinal substance is applied to a susceptible portion of the body, externally or internally, an action is excited, which is extended more or less, according to the diffusibility of the properties of the substance, or the degree of sympathetic connexion which the part may maintain with the body generally. Thus a set of actions is raised, every one of which is precisely similar, provided they are confined to the same system, by which is to be understood parts of an identity of structure. If, however, the chain runs into other systems, it loses its homogeneous character, the actions being modified by the peculiar organization of the parts in which they may take place. These are principles of universal application. In every case, whether it respects the operation of remedies or the production of disease, the spot primarily acted upon is a point from which is diffused the radiated impressions."—vol. i. p. 70, 71.

It may easily be gathered from the sentiments already expressed, that we do by no means subscribe to this theory. Like most sweeping generalizations, it is altogether too exclusive, and fails to account for the operation of a very large portion of medicinal substances, which seem to act upon a principle entirely different. No better proof of the inadequacy of this theory can be required, than

Dr. Chapman's own work. Take, for instance, what he says concerning the Oil of Turpentine. In treating of the virtues of this article in correcting the lithic diathesis, and relieving nephritic pains, he adds, "on what principle it operates is not very intelligible, though it would seem that its appearance in the bladder is necessary to its success. I am told by Dr. Physick, to whom I owe much of the information which I possess on the subject of this article, that whenever it has failed with him, the *violet odour* was wanting in the urine."—vol. i. p. 343. It is very plain that Dr. Chapman here abandons his own theory; for if the doctrine of sympathy could explain the operation of the turpentine, why is he forced to confess that the "principle on which it operates is not very intelligible?" Nothing can be clearer than that sympathy, at least as explained by our author, has nothing to do in this case. The fact speaks for itself. The turpentine must be taken into the circulation, and afterwards act directly upon the urinary organs, or else the *violet odour* could not be detected in the urine. Here, then, is at least one clear and pointed exception to Dr. Chapman's theory.

Let us take another illustration. In discussing the general action of "Lithontriptics and Antilithics," it is stated that the possibility of dissolving a stone in the bladder by a course of medicine rests upon two grounds, one of which is the following, viz. "that some of these solvents do reach the urinary bladder, without any, or at least, a material change being wrought in their properties, so that when coming in contact with the stone, there might be a play of chemical affinities, and hence a decomposition of the calculous body."—vol. i. p. 322. Now, here is an unqualified admission, of not a *single* medicine, but a *whole class* of medicines acting upon principles purely *chemical*. In so far, therefore, as this class of remedies is concerned, it cuts short the doctrine of sympathy, and proves beyond a doubt that the unlimited manner in which that doctrine is maintained by Dr. Chapman is wholly untenable. No "sympathetic actions," nor "associated motions," nor "radiated impressions diffused from a point," can ever dissolve a stone in the bladder, or account for the varied appearance of the urine, resulting from the use of internal remedies.

Another exception to Dr. Chapman's theory may be found in the list of Anthelmintic medicines, a large portion of which are admitted to act by their poisonous properties upon the animal. But it is unnecessary to push this subject any further. Enough has been adduced to prove that the doctrine of sympathy can only be admitted with such large qualifications and exceptions, as to overturn completely the theory that medicines uniformly and universally act upon this principle alone. I hope not to be misunderstood. In explaining the operation of medicines I do by no means deny altogether the agency of sympathy, or some principle very similar to it. To contend that all medicines act through the medium of the circulation would not be less contradictory to reason and fact than the doctrine which has been combatted. I do not believe in this wonderful simplicity of nature, which has been so favourite an argument with every theorist who has attempted to explain the intricacies of a whole science upon *one* general principle. Dr. Chapman, for instance, tells us, that "to

multiply causes superfluously is against one of the fundamental rules of philosophising, and is not less repugnant to the general course of nature, whose means are proverbially distinguished by great simplicity and uniformity." This is true indeed; but then it is equally unphilosophical not to assign causes *sufficient* to explain known and acknowledged phenomena; and, as it regards the present case, it rests with Dr. Chapman to show that by calling in the aid of the circulation we multiply causes unnecessarily. An excessive fondness for simplification has been the bane of medical science. It was this which led Brown to maintain the absurd doctrine that all medicines were stimulants, the only difference between them being in the force and rapidity with which they exercised their stimulating powers. It was this which prompted Dr. Rush to defend the strange notion of the unity of disease, and it is this which induces Dr. Chapman to contend for the exclusive agency of sympathy, in explaining the operations of medicines. Wanting, as they all do, the broad and substantial basis of truth and philosophy upon which to rest, it is impossible that their influence should be other than transient and ephemeral. The theory of Brown has long since been abandoned. The unity of disease, notwithstanding the zeal, and talents, and eloquence with which it was defended, was falling by its own weight, even before the death of its illustrious author. And it requires not the spirit of prophecy to predict that a similar fate awaits the theory of Dr. Chapman.—B.]

## FIRST DIVISION.—OF GENERAL STIMULANTS.

This division, according to the preceding table of classification, includes the four classes of Narcotics, Antispasmodics, Tonics, and Astringents,—these agreeing in the general stimulant operation they exert on the system, and differing principally in the diffusibility and permanence of action. They are therefore strictly connected, at least so far as to form a series through which the transition is easily traced.

# CHAP. II.

### NARCOTICA—NARCOTICS.

Narcotics, according to the definition usually given of them, are substances which diminish the actions and powers of the system, without occasioning any sensible evacuation. This definition is imperfect, in as much as it does not include that stimulant operation which the most powerful of them at least equally produce, and which

in part must be admitted as the cause of these effects. The term Narcotic is the most unexceptionable that can be assigned to these remedies. They are also named Sedatives, from their tendency to diminish action; Anodynes, from their capability of alleviating pain; and Hypnotics, or Soporifics, from their power of inducing sleep.

The following are the general effects from their operation, selecting, as affording an example of this, the most powerful of the class. In a moderate dose they increase the force and frequency of the pulse, promote the secretions, give vigour to the body, and rouse the faculties of the mind, inducing hilarity or intoxication. These effects are however only temporary, and, after some time, symptoms of an opposite kind make their appearance; the pulse not only returns to its former standard, but becomes more slow, and at the same time full and soft; the respiration is more easy; the secretions, excepting that by the skin, are diminished; pain and inordinate motion, if present, are alleviated or depressed: there is a general languor, averseness to motion, and dullness to sense; the mind is placid and inactive; and this state soon terminates in sleep. This, after continuing for some time, is followed by temporary debility, marked by some degrees of sickness, tremors, and anxiety. If the dose has been large, these symptoms of diminished sense and action are induced without any previous increased action; or, if a still larger dose has been given, the consequences are delirium, paralysis, convulsions, coma, and death.

These effects are diversified, however, as arising from different Narcotics. In some, any stimulant operation is scarcely perceptible in any dose; others, with the narcotic power, possess an acrid quality, and, in a large dose, with these general effects, induce irritation or inflammation of the stomach, by which their action is modified. Some are more apt to induce sickness than others; and there is reason to believe, that there are others in which the action is not equal on the nervous and vascular systems, but is more determined to the one than to the other.

The medicines belonging to this class act primarily upon the stomach, whence their action is propagated by nervous communication to the rest of the system. That they do not act by being received into the blood is evident from the fact, that their effects are apparent in general in a short time after they have been swallowed; and it has been found on dissection immediately after these effects have appeared, that the whole of the quantity administered has remained in the stomach undissolved.

Applied externally, these medicines often exert their usual action, though with less force. Opium deadens pain, and represses spasmodic muscular action, and this not only in the part to which it is immediately applied, but in others more distant. Several others of the class have similar effects; and their operation in this mode of application, too, seems to be extended by the medium of the nerves.

Narcotics applied to the muscles of animals quicken at first their action; but in a short time they exhaust irritability and sensibility. The heart, even of cold-blooded animals, is deprived of all power of

motion by a strong solution of opium applied for a few minutes. When injected into the blood-vessels, the animal instantly dies without convulsions, and all the muscles of the body, voluntary or involuntary, are deprived of the power of contraction. When applied to a wound, they often affect the general system; and in this case they appear to act, by being received through the divided veins into the circulation, the interposition of a ligature on the blood-vessels preventing the effect.

In the production of the effects arising from the action of Narcotics, the brain seems to be the organ chiefly affected, and it is from this affection that death seems to follow from their operation, the direct action on the heart being much less considerable. This has been clearly established by the experiments of Mr. Brodie. On introducing alcohol into the stomach of a small animal, or injecting a small quantity of the juice of aconite, or of the essential oil of the bitter almond diffused in water, or of the leaves of tobacco, into the rectum, or in a concentrated state into a wound, the loss of voluntary motion, and total insensibility, were produced; yet when this state was allowed to continue until the external signs of apparent death were produced, the heart, when exposed to view, was found contracting with considerable force, and, by inflating the lungs, and produeing artificial respiration, its action could be kept up nearly to the natural standard for a considerable period. It appears, therefore, that while the nervous system was so much affected as to produce the cessation of the principal functions dependent on it, the powers of the circulating system were little impaired; and the failure of the circulation ultimately producing death, appears in such cases to arise principally from the respiration ceasing, in consequence of this function being so much more dependent on the influence of the nerves. The immediate effects of narcotics arise, therefore, from affection of the functions of the brain; the function of respiration is affected in consequence of this, and at legth ceases, and this occasions, or at least accelerates, the failure of the circulation, which produces death. From this an important conclusion follows. In the case of insensibility produced by the operation of a narcotic, as the heart continues to act, it is possible, that if the cessation of its action be prevented by keeping up respiration artificially, the affection of the brain may pass off, and the functions of life be restored. Mr. Brodie has stated some striking experiments in proof of this. In a rabbit, the state of total insensibility was induced by a drop of the essential oil of bitter almond inserted into a wound; after five minutes respiration had ceased; the heart was felt beating through the ribs, but its motion must have soon ceased, and life been extinguished: artificial respiration was excited; in six minutes the animal moved and made an effort to breathe; these efforts were repeated; after sixteen minutes the artificial respiration was discontinued, spontaneous respiration being established; all the functions revived, and in two hours the animal appeared to be perfectly well. In another case, the animal recovered from a state of insensibility, after artificial respiration had been continued for nearly three hours. From these facts, the preventing the failure of respiration, and the exciting it, if necessary,

artificially, at the same time keeping up the proper animal temperature, would appear to be important indications in the extreme state of exhaustion occasioned by the operation of a narcotic, such as alcohol or opium.

There are some narcotics which operate with more force on the muscular fibre, and directly affect the heart. The infusion of tobacco injected into the intestines occasions immediate loss of motion and sensibility, and the heart, instead of continuing to contract, was found by Mr. Brodie to have ceased contracting, and to be distended with blood. The poison of the *upas antiar* has a similar effect.

The theory of the operation of narcotics is attended with considerable difficulty, and very different opinions have been maintained with regard to it.

As they in general diminish the actions of the system, when given even in a small dose, their primary action was considered as of a depressing kind, and they were described by authors under the appellation of Sedatives. The stimulant effects which were observed sometimes to arise from their action were ascribed to what was termed the re-action of the system. It was supposed, that there belongs to the animal frame a force or principle, the tendency of which is to resist and obviate the effects of any thing noxious. If such an agent were applied, this principle was believed to be roused into action, and the powers of the system were excited to throw off the noxious application. On this hypothesis the action of narcotics was explained by Cullen. Their natural tendency was supposed to be to depress the powers of life; if given in a large dose, this was exerted with effect, and hence the symptoms of exhaustion; but if given in a smaller dose, the *vis medicatrix*, or preserving force, was enabled to resist, and by its resistance occasioned the symptoms of increased action that first appeared. These substances, therefore, were considered as directly sedative, and as indirectly stimulant.

The reverse of this view was advanced by Brown, narcotics being regarded as stimulants, surpassing all others in the diffusibility and little durability of their action. On this principle, their effects were explained in the following manner. It is the necessary effect of stimulant operation to produce for a time increased action; but as this is attended with a diminution of vital power, the excitement soon ceases, and diminished action succeeds. And the depression is proportional partly to the quantity of the stimulant and partly to the rapidity of its action. Thus narcotics were regarded by Brown as powerful stimulants, the operation of which is not confined to the part to which they are applied, but is rapidly extended over the system. In a moderate dose they promote action of every kind; but this is succeeded by debility proportioned to the excitement that had been raised: and in a large dose they produce diminution of power, and consequently of action, without any symptom of previous excitement. Hence they are directly stimulant, and indirectly sedative.

If, in investigating this subject, we merely contrast these two theories, little doubt can remain of the superiority of the latter. The former is founded on the fanciful hypothesis, established by no evidence, that a power presides over the system ready to resist every

noxious application; the latter is more strictly deduced from the properties of the substances whose operation is to be explained: For, as it is proved, and indeed admitted, that the stimulant effects from the exhibition of narcotics follow immediately, and previous to any symptoms of languor and debility, these ought to be considered as the consequences of the former. The most extensive analogy, too, may be traced between the operation of narcotics and other substances allowed to be stimulant, but which are less rapid in their action; as, for example, between ardent spirits and opium, though in the one the stimulant, in the other the sedative operation, is usually more apparent. And the advantage derived from the administration of narcotics in some diseases of diminished action, is scarcely compatible with the supposition of their exerting a depressing power.

The principal difficulty attending the theory arises from the sedative power of these substances not being always proportional to their stimulant operation: it is often greater than this, and in several of them, indeed, any previous stimulant effect is scarcely perceptible. Yet this difficulty is in some measure obviated by the fact, unquestionably established, that substances, the stimulating action of which is undoubted, as ardent spirit, if given in a very large dose, produce depression without any previous perceptible increased action. In like manner, electricity in moderate intensity stimulates the muscular fibre to contraction, while in a highly concentrated state it produces total exhaustion of the contractile power. The more forcibly, therefore, a stimulant operates, the more rapid does the immediate action appear to be produced, and the more quickly to cease, so as to be followed by the secondary effect; and with the admission of this principle, may perhaps be explained the fact, that the sedative effects of narcotics appear often greater than their previous stimulating operation; the exhaustion following so rapidly, that any previous excitement is scarcely to be perceived. Narcotics, therefore, so far as we can speculate with any probability on their action, may be regarded as general diffusible stimulants.

The hypothesis may also be maintained, perhaps, that along with their stimulating operation, they *directly* exhaust the powers of life; and that these two modes of action are not strictly proportional, but are different in different narcotics. The effects of certain chemical agents on the vital functions, as of nitrous oxide, and carburetted hydrogen, favour an hypothesis of this kind; the one producing high excitement without proportional depression, the other producing exhaustion of power without previous increased action. The truth, however, is, that from our imperfect knowledge of the laws of the living system, all such speculations are deficient in precision; nor can we do more than state the most general analogies, without attempting to extend them to minute applications.

As narcotics are capable of being administered so as to obtain from their action either stimulant or sedative effects, they may be employed as remedies, with the view of producing either of these. The exciting operation, however, is in general so transient, that few of them can be administered with advantage as stimulants. When given with this intention, they are applied in small doses, frequently

repeated, as thus the state of excitement is best sustained. More usually they are given with the view of obtaining that state of diminished action and diminished susceptibility to impression, which is the more common, and more easily regulated consequence of their operation; they are then given in larger doses at more distant intervals. As stimulants, they are employed in various forms of continued fever, remittent and intermittent fever, and numerous diseases of debility. As sedatives, they are more extensively used to alleviate or remove spasmodic action, to allay pain and irritation, to induce sleep, and to restrain morbidly increased evacuations and secretions.

There is a peculiarity in the operation of narcotics, that by repetition their action on the system is diminished, so that, after having been used for some time, they require to be given in increased doses to produce their usual effects, and quantities of them have at last been taken, which at first would have destroyed life. No satisfactory explanation has been given of this, for it is not connected with any apparent permanent change in the system; but it requires to be attended to in their administration. It appears too to be more peculiarly the case with some than with others. It is remarkably so with opium, tobacco, hemlock, or henbane, while it is scarcely to be observed with regard to foxglove.

The individual narcotics may be arranged partly from their chemical relations, partly from analogies in power.

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## NARCOTICS.

Alcohol.
Ether.
Acidum Prussicum.
Camphor.
Papaver Somniferum.
Hyoscyamus Niger.
Atropa Belladonna.
Aconitum Napellus.
Conium Maculatum.
Digitalis Purpurea.
Nicotiana Tabacum.
Lactuca Virosa.
Lactuca Sativa.
Datura Stramonium.
Arnica Montana.
Rhododendron Chrysanthum.
Rhus Toxicodendron.
Humulus Lupulus.
Strychnos Nux Vomica.
Prunus Lauro-Cerasus.
Amygdalus Persica.
Cocculus Suberosus.

Alcohol. Alcohol. *Ardent Spirit. Spirit of Wine.*

By the process of vinous fermentation, liquors are formed from certain vegetable juices, or infusions, possessed of pungency, spiritous flavour, and intoxicating power. From these liquors a product is obtained by the process of distillation, which was named Pure Ardent Spirit, or Spirit of Wine, by the older chemists, and is now termed Alcohol. This substance operates on the living system as a highly diffusible stimulant; in the state of spiritous and vinous liquors it is employed for medicinal purposes; and in its pure form is an important pharmaceutic agent.

The conditions necessary to the vinous fermentation are the presence of a certain quantity of sugar, water, and a substance named *ferment*, of which yeast is a variety. In the sweet vegetable juices, as those of the grape, currant, gooseberry, pear, apple, &c. these substances are present, and vinous fermentation in them begins spontaneously. When it commences, the fluid becomes turbid, an intestine motion takes place, the temperature rises, and a large quantity of carbonic acid gas is formed and disengaged; after these changes have gone on for some time they cease, and the liquid becomes transparent: it has now lost its sweet and bland taste, and become pungent and intoxicating. The chemical change which has happened is, that the sugar has disappeared, and instead of it alcohol exists in the fluid.

The admission of the air is not necessary to the vinous fermentation. The changes that happen must be owing, therefore, to re-action between the constituents of the liquid, and it is not difficult to infer what this re-action must be. Sugar consists of three atoms of carbon, three of oxygen, and three of hydrogen. If we take away one atom of carbon and two of oxygen, that is, an equivalent of carbonic acid, there will remain two atoms of carbon, one of oxygen, and three of hydrogen, which is the composition of alcohol. Or fermentation consists in the abstraction of an equivalent of carbonic acid from an equivalent of sugar, and the consequent production of alcohol.

There is only one circumstance obscure in the theory of fermentation, the agency of the *ferment*. The presence of this substance, which appears to resemble in its nature the vegetable principle gluten, is essential to the process, yet a very minute quantity of it is sufficient, and even this seems not to suffer decomposition.

Starch as well as sugar is capable of undergoing the vinous fermentation. Generally it passes first to the state of sugar before it ferments; and as it differs from sugar only in containing six instead of three atoms of each ingredient, this change it readily undergoes.

When fermented liquids are submitted to distillation, the alcohol being more volatile than the water passes over in a purer state, but is still combined with a considerable quantity of water, and with vegetable matter which gives it flavour. Thus are produced the different spiritous liquors, brandy, rum, &c. By repeated distillation from these, in the manner which shall be explained in the pharmaceutical part of the work, alcohol is obtained in a concentrated form.

An opinion was advanced by Fabroni, that the alcohol obtained from wines and spiritous liquors does not previously exist in them, but is formed during the distillation. Mr. Brande shewed that this opinion is incorrect, by separating the alcohol from fermented fluids without distillation; and the same has been shewn by Guy-Lussac, by distilling them *in vacuo* at the temperature of 60°. The following table exhibits the proportions of alcohol which Mr. Brande obtained from different spiritous liquors and wines.

| | Proportion of alcohol *per cent.* by measure. | | Proportion of alcohol *per cent.* by measure. |
|---|---|---|---|
| Scotch Whisky, | 54.32 | Claret, highest, | 17.11 |
| Irish Whisky, | 53.90 | —— lowest, | 12.91 |
| Rum, | 53.68 | —— average, | 15.10 |
| Brandy, | 53.39 | Burgundy, | 14.57 |
| Hollands, | 51.60 | Champagne, (still), | 13.80 |
| Lissa Wine, | 24.41 | ——— sparkling, | 12.80 |
| Port, highest, | 25.83 | Hock, | 12.08 |
| —— lowest, | 19.24 | Gooseberry Wine, | 11.34 |
| —— average, | 22.97 | Tokay, | 9.88 |
| Madeira, average, | 22.27 | Cider, | 7.54 |
| Cape Madeira, | 20.51 | Perry, | 7.20 |
| Currant Wine, | 20.55 | Ale, (Burton), | 8.88 |
| Sherry, highest, | 19.81 | —— (Edinburgh), | 6.20 |
| ——— lowest, | 18.25 | —— (Dorchester), | 5.56 |
| ——— average, | 19.17 | London Porter, | 4.20 |
| Teneriffe, | 19.79 | Small Beer, | 1.28 |

In this table is presented a singular fact, that the intoxicating power of wine is not equal to what might be expected from the portion of spirit it yields by distillation. Brandy, for example, according to Brande's experiment, affords about 53 *per cent.* of alcohol, while port wine yields from 21 to 25 *per cent.*; yet the spiritous strength of the latter, estimated by its action on the living system, is certainly not equal to one-half that of the former. The reason of this probably is, that in wine, the alcohol has its activity diminished by the other principles with which it is combined.

Pure alcohol is colourless and transparent; its odour is fragrant, and its taste highly pungent; it is lighter than water, the difference being greater as the alcohol is more pure and concentrated; hence the specific gravity is the best test of its strength. As prepared by the usual processes, it is of the specific gravity .835, and it is of this strength that it is ordered in the Pharmacopœias of London and Edinburgh as fit for pharmaceutical purposes. The Dublin College order it of the specific gravity of .840 at 60°, or .844 at 52°. By repeated distillation from substances having a strong attraction to water, alcohol can be obtained of greater purity till it be of the specific gravity .796, when it seems to be free from water. The best method for procuring this "absolute alcohol" is that of Mr. Graham, to place alcohol in a shallow basin under the receiver of the air pump, with dry quicklime in a basin beside it. The lime absorbs the vapour of the water but not that of the alcohol, and after some days the alcohol is completely deprived of water. When of the common strength, alcohol is so volatile as to evaporate speedily at the common temperature of the atmosphere; it boils at 176° of Fahrenheit; it does not suffer congelation by exposure to the greatest natural or artificial cold. It is highly inflammable, burning when its temperature is raised not much above 300°. The products of its combustion are water and carbonic acid. Alcohol unites with water in every proportion. It dissolves many saline substances, a number of the vegetable principles,—resin, camphor, essential oil, balsam, extract, saccharine matter, the vegetable alkalis, and also part of the gum-resins.

From this solvent power, alcohol is a very important pharmaceutic agent, particularly as applied to the vegetable articles of the Materia Medica; the principles which it dissolves being those in which medicinal powers frequently reside, and being dissolved by it in such quantity as to afford very active preparations. It has another important property, that of counteracting the spontaneous changes to which vegetables are liable from the re-action of their elements; and hence these solutions or Tinctures retain their properties unimpaired. When diluted with water, it still exerts its solvent power to a certain extent, added to the solvent power of the water; and this diluted alcohol, under the name of Proof Spirit, is even more generally employed in pharmacy as a solvent of vegetable matter, than alcohol in its pure form.

Alcohol is a powerful and highly diffusible stimulant. Taken in a moderate quantity it immediately increases the force of the circulation, communicates a greater degree of muscular vigour, and excites exhilaration of mind. These gradually subside, and are followed by proportional languor. If the quantity is more considerable, its exciting effects are more quickly produced, and are followed by intoxication, temporary delirium, and stupor; and in a large dose it occasions death, with scarcely any symptoms of previous excitement. Its analogy in producing these effects to other narcotics is sufficiently obvious. Its exciting power, however, appears to be rather more permanent than that of some of the medicines of this class; hence, while it can be successfully employed to rouse the powers of the system, it can scarcely be used with equal advantage to repress irregular action, diminish irritation, or induce sleep.

Alcohol, in a concentrated state, can scarcely be said to be employed in medicine. Sometimes it is used as an application to burns, and to certain states of local inflammation not connected with increased action; it is applied by friction to relieve muscular pains; or to bleeding wounds to restrain hæmorrhage. Spiritous liquors, which consist of diluted alcohol, are employed as general stimulants to excite the actions of the system. Their stimulant operation, however, is not sufficiently permanent, or capable of being regulated, to admit of their being employed, except as occasional remedies. They are, however, of much benefit in the last stage of Typhus fever, when the pulse is scarcely perceptible, and there is a general coldness of the whole surface,—more particularly in those individuals who have, when in health, been much addicted to their use.

In delirium tremens also, a disease common among habitual drunkards, it is often necessary to resort to the employment of spirits, as the tremours evidently depend on the exhausted state of the nervous system, and consequently are aggravated if the wonted stimulus be entirely withdrawn. Sometimes it is necessary to give opium at the same time to a considerable extent.

The action of Wine on the system, though analogous to that of alcohol, is not precisely alike; its stimulant operation appears to be less sudden and more durable; hence it can be employed with more advantage as a tonic. It is as a tonic indeed, rather than as a narcotic, that wine is administered. Its chief medicinal application is in

the treatment of fevers of the typhoid type, to support the strength of the system, and to obviate symptoms arising from debility. With these views, it is given with more advantage than any other tonic,—a superiority derived from its stimulating power being obtained with more certainty, and being more easily regulated by due administration, from its being more grateful, and probably not requiring to be assimilated by the digestive organs to produce its effects. The quantity in which it is given is dependent on the state of disease; the object to be obtained is that of supporting the strength of the system until the fever has run its course; the danger to be avoided is that of giving it so largely, as to occasion any degree of exhaustion. Its administration is regulated, therefore, by the effects it produces; advantage being always derived from it, when it renders the pulse more slow and firm; when the recurrence of delirium is prevented; when irritation is lessened, and sleep induced. If the pulse is quickened, and the countenance becomes flushed; if it excite thirst, increase the heat of the body, and occasion restlessness or delirium, it is obviously injurious, and the dose must either be diminished, or its use suspended. It is to be observed, however, that the system will bear a greater quantity of wine in the latter stages of fever, than it would while in a state of health.

Since the views of Clutterbuck, Mills, and Armstrong, regarding the proximate cause of fever, have been promulgated, wine has not been so frequently employed in continued fever, at least the use of it has been deferred to the latter stage of that disease. Nor has it been in them given to the extent of one, two, or even three bottles, as was formerly the case. The usual dose is from 6 to 10 ounces in the generality of cases, varying, however, according to the previous habits of the patient, and the extent of the debility. It is rarely, indeed, that more than half a bottle is required in the course of twenty-four hours,—and then only in the more severe cases.

It is of great economy in large hospitals to give the wine in the form of negus, as hot as the patient can bear, its effects then being more generally diffused over the whole system, and with the addition of warmth, less wine being required.

During the use of port wine, which is the kind most commonly employed, it is of importance to attend to the state of the bowels, as they are apt to be constipated. Some gentle laxative ought in that case to be taken, such as the Oleum Ricini, or Aloetic Pills.

In tetanic affections, wine has been given to the extent of several bottles daily; but it is not clear how far the cure was the effect of the wine, as a considerable quantity of opium was administered at the same time.

In various diseases of chronic weakness, or where the strength of the system has been reduced by profuse evacuations, or by any other debilitating operation, wine is in common use as a cordial and tonic.

Different wines have different effects, according as they are possessed of astringency, or as they are sweet or acescent; and are hence adapted to answer different indications.

The wines prepared from other fruits than the grape are less

spiritous and more acescent, and are hence inferior in tonic power. Fermented liquors, especially porter, are sometimes substituted for wine, where this is necessary from idiosyncracy; and their powers are somewhat modified by their other qualities, particularly their bitterness, and by the pungency arising from their excess of carbonic acid. Their narcotic power too is often greater than is proportioned to their vinous strength, from the addition of narcotic substances which they often receive in their preparation.

From the immoderate and long-continued use of vinous and spiritous liquors many diseases derive their origin; dyspepsia, hypochondriasis, visceral obstructions, chronic inflammation of the liver, and gout,—morbid states probably arising either from the increased action it excites, giving rise to organic derangement, or from the exhaustion of power, general or local, produced by stimulant operation unnecessarily excited or too long continued. In an excessive dose, spiritous liquors produce a state of coma or apoplexy, which has sometimes a fatal termination. Evacuation of the stomach by a powerful emetic is the remedy obviously indicated; and from what has been stated under the general account of the operation of narcotics, (page 62,) the propriety of sustaining respiration by artificial inflation of the lungs, if necessary, is equally obvious. Ammonia, in the quantity of a few drops in water, is also a remedy that has been found of efficacy.

Æther Sulphuricus. *Sulphuric Ether.*

Alcohol suffers decomposition from the action of the more powerful acids upon it; and substances are formed by the decompositions which have a resemblance in their properties, though, as produced by the action of the different acids, they have also peculiar powers. They are named Ethers. Sulphuric Ether, formed by the action of sulphuric acid on alcohol, is the one that has been chiefly applied to medicinal use; its powers are those of a narcotic. Nitric ether, in the state in which it has been used, dilute, and with a portion of free acid, forming the spirit of Nitrous Ether, or Dulcified Spirit of Nitre, acts principally as a diuretic, and is therefore placed under that class.

Sulphuric ether is obtained by exposing a mixture of sulphuric acid and alcohol in equal weights to a heat sufficient to produce ebullition; the ether is the product of the action of the acid on the alcohol; it distils over, and is purified by a second distillation, any free acid being abstracted by an alkali. The process is considered more fully in the pharmaceutical part of the work.

Sulphuric ether is colourless and transparent, highly odorous and pungent, and of a specific gravity inferior to that of alcohol, being, when highly rectified, not more than .720, and it is said to have been procured of as low a density as .632. Mr. Brande doubts this, and states, that he has never obtained it lighter than .700. It is very volatile, so as to evaporate speedily at natural temperatures; and from its rapid transition to vapour, it produces much cold during its evaporation. *In vacuo* it boils below the freezing point of water, and under the atmospheric pressure it boils at 98°. It is highly inflammable, and affords by its combustion water and carbonic acid.

Sulphuric ether is a powerful diffusible stimulant, somewhat analogous to alcohol in its action, and like it capable of producing intoxication. Its stimulant operation appears to be even more suddenly exerted, and to be less durable : hence its superiority as a narcotic and antispasmodic. As a stimulant, it is sometimes given in occasional doses in typhus fever, more particularly in those cases where symptoms are present connected with spasmodic action ; it is also given in other forms of fever, to obviate nausea ; a tea-spoonful of ether, given in a glass of white wine, is said to be useful in abating the violence of sea-sickness. As an antispasmodic, it is employed in spasmodic asthma, and sometimes affords sudden and complete relief, producing for a time at least remission of the paroxysm ; it is also given with advantage in the hysteric paroxysm ; it is one of the most powerful remedies in cramp of the stomach, and singultus : and it sometimes relieves some of the symptoms of cholera, especially the vomiting. Its usual dose is a tea-spoonful, equal to about a drachm ; but its beneficial effects are frequently not obtained, unless it be given in a larger dose, or until the dose has been repeated at short intervals. In dyspnœa and catarrh, its vapour inhaled into the lungs affords relief, probably from its antispasmodic power. The mode of applying it in this form is to allow it to drop slowly on hot water in an inhaler, and inspire the vapour of it with the steam of the water, or simply to drop a little of it on a lump of white sugar, which is to be held in the mouth, and the vapour inhaled. It is also applied externally, and produces very opposite effects, according to the manner of the application. If it be dropt on the surface of the body, and its evaporation prevented, it has a stimulant and rubefacient effect ; but if the part be exposed to the air, the ether evaporates rapidly, and produces a considerable degree of cold. Managed in the former way it relieves muscular pains, and is an excellent application to burns. In the other mode, it has been employed to favour the reduction of strangulated hernia, being dropt on the tumour, and allowed to evaporate freely, when the cold from its evaporation causes the part to contract and retire.

Acidum Prussicum. Prussic Acid. Hydrocyanic Acid.

This acid consists of hydrogen combined with a compound radical, cyanogen, which consists of carbon and nitrogen. Several plants contain this acid, as the cherry laurel, peach and bitter almond ; but for use in a pure form, it is prepared from a metallic salt, the cyanuret of mercury : the process for preparing it shall be afterwards described. (See Part II. of this work.)

Prussic acid is extremely volatile, boiling at a temperature of 80° ; and when it is concentrated, it evaporates so rapidly on exposure to the air, that part of it congeals from the cold produced by the evaporation of the rest. It has a strong pungent odour, similar to that of the bitter almond and peach blossom. It cannot be preserved for any length of time, as it suffers spontaneous decomposition.

Prussic acid is a most energetic poison ; a small animal is killed instantly by a drop of it let fall on the eye or tongue ; even the va-

pours from it cause faintness, stupor, with pain and oppression at the chest, which last for several hours. The muscles of animals killed by it are found to have lost their irritability.

This acid was introduced into practice by M. Magendie, in France, and Dr. Granville, in England. It seems, however, to have been previously employed by Professor Brera. From its sedative action, it is said to be useful in spasmodic irritation of the lungs, chronic catarrh, asthma, pertussis; and its use has likewise been extended to phthisis, more particularly in its early stages. It has been employed also in palpitation, aneurism of the heart and of the aorta. Dr. Thomson, and likewise Dr. Elliotson, have advised it to be used in dyspepsia, combined with tonics, when that affection is attended with acidity and heat and soreness of the tongue. Its dose is from one drop to ten. It is at all times a hazardous remedy, from being variable in its strength, and a number of instances have occurred, in which severe and even fatal consequences have ensued from this cause. Often, on the other hand, it is so weak from decomposition as to produce no effect.*

If taken in too concentrated a form, or too large a quantity, it occasions death, and that so immediately, that there is scarcely opportunity for having recourse to antidotes. The stomach pump, sulphate of copper in a dose of 3 or 4 grains, brandy, strong coffee, and oil of turpentine have been recommended in cases of this kind. Artificial respiration ought to be kept up, as the shock to the nervous system may be only transient; and the prussic acid being soon carried off by its volatility, the powers of life may be restored.†

Camphora. Camphor. Laurus Camphora. *Cl. Enneandria. Ord. Monogynia. Nat. Ord. Oleraceæ,* Linnæus. *Laurineæ,* Jussieu. *Habitat Japan, India.*

Camphor is a peculiar vegetable principle, the composition of which has been already stated (p. 38). It is not the produce exclusively of one vegetable, but it is contained in many plants, especially those of the aromatic kind, diffused through their wood or bark, and is often deposited from their essential oils when these are long kept. The oils of peppermint, thyme, sage, and a number of others thus afford it. For the purposes of commerce, it is obtained from a species of laurel, the Laurus Camphora, a native of Japan and Sumatra. It exists in

* *Incompatible Substances.* The mineral acids, the sulphurets, nitrate of silver, salts of iron, oxides of mercury and antimony, and chlorine.—B.

† The most efficient remedy in cases of poisoning by the hydrocyanic acid, is the inhalation of the *aqua ammoniæ* diluted with about ten or twelve parts of water. This remedy was first suggested by Mr. John Murray of London, and afterwards confirmed by Orfila. In experiments made upon cats for the purpose of testing it, I have found its efficacy fully verified. The same quantity of acid was given to a number of these animals; those left to themselves died, while the others were recovered by causing them to breathe the ammoniacal water. Diluted *chlorine* is another remedy which has been used with success; indeed Orfila gives it the preference to ammonia. The mode of using it is to impregnate water with one fourth of its volume of chlorine, and cause this to be inhaled. The great advantage of the ammonia over the chlorine is, that it is an article always at hand, a matter of very great importance in a case where the poison operates with such overwhelming rapidity.—B.

grains in the wood of the root and branches of this tree. It is extracted by sublimation; the wood is exposed to heat with a quantity of water, and the temperature thus communicated is sufficient to volatilize the camphor. In Europe, it is purified by a second sublimation, with the addition of one-twentieth of its weight of lime. The Dryabalanops Camphora is named in the Dublin Pharmacopœia as one of the sources of camphor, but Dr. Duncan has shewn, on the authority of Marsden, that this is a mistake.

Camphor is colourless, semi-transparent, tenacious, and somewhat unctuous to the touch; its smell is strong and fragrant; its taste pungent and bitter; specific gravity .988. It is volatile at natural temperatures, and soon diminishes in bulk from exposure to the air; it melts at 288°, and boils at 400°; is highly inflammable; is very sparingly soluble in water, one fluid-ounce dissolving little more than half a grain; but is soluble in alcohol, ether, and oils essential or expressed.

In a moderate dose, camphor produces effects similar to those of other narcotics. Its stimulant operation, however, is not considerable; and in a large dose it diminishes the force of the circulation, induces sleep, and sometimes causes delirium, vertigo, convulsions, or coma.

As a stimulant, camphor has been used in typhus, cynanche maligna, confluent small-pox, and other febrile affections accompanied with debility, in retrocedent gout, and to check the progress of gangrene; but its stimulant operation is scarcely sufficiently permanent to admit of being easily regulated. As a sedative, it is used in affections of an opposite nature, pneumonia, rheumatism, and gonorrhœa, combined with nitre, or antimonials, or by itself, where evacuations have been previously employed; in these cases also it is now little employed in practice. In mania, it has sometimes succeeded as an anodyne; as an antispasmodic, it has been used in asthma, chorea, and epilepsy. If given in excess, the best antidote is opium.

The dose of camphor is from 5 to 20 grains, but it is seldom that it is given at once in so large a dose as the latter quantity, from being liable to produce nausea and irritation. In small doses, on the other hand, it produces little effect, unless they are frequently repeated. In divided doses, it may be given to the extent of a drachm in the day. It is certainly very beneficial in soothing and allaying irritability resulting from a nervous constitution, as is particularly to be observed in many females; but as a medicine of decided energy in severe nervous affections, little reliance can be placed on it. Its power of checking the progress of grangrene has been supposed to be augmented by combination with musk, or carbonate of ammonia, but the efficacy of this combination is doubtful: combined with opium, it forms a diaphoretic; and its efficacy in inflammatory diseases is promoted by antimonials.

Camphor ought to be given in a state of mixture in some liquid form, as in the solid state it is liable to excite nausea. It may be diffused in water by trituration with sugar, mucilage, or almonds. The camphorated mixture of the London Pharmacopœia, in which it is triturated with water, is a preparation in which, from the sparing

solubility of camphor in water, little more than its taste and odour are obtained. In the pharmaceutic treatment of camphor, it is necessary, in order to reduce it to powder, to add a few drops of alcohol during the trituration. Magnesia, by being triturated with it, has the effect of dividing and rendering it smooth, and may be used for its suspension in water; a number of the gum-resins also act on it in such a manner, that, from their mixture, a soft uniform mass is formed, and this affords another mode of diffusing it. From this chemical action, it cannot well be combined with gum-resins in the solid form.

Externally applied, camphor is used as an anodyne in rheumatism and muscular pains, and as a discutient in bruises and in inflammatory affections; it is dissolved in alcohol or expressed oil, and applied by friction to the part. Added to collyria, or mixed with lard, it is of advantage in ophthalmia. Suspended in oil, it is used as an injection in ardor urinæ, and as an enema to relieve the uneasy sensations occasioned by ascarides. The combination of it with opium is useful as a local application in toothach.*

Officinal Preparations.—Tinct. camph. Tinct. camph. composit. Emulsio camphorata. Acid. acet. camphorat. Tinct. saponis camphorat. Liniment. saponis cum opio. Oleum camph. Mist. camph. Liniment. camphoræ composit.

Papaver Somniferum. White Poppy. *Polyand. Monogyn. Rhœades,* Linn. *Papaveraceæ,* Juss. *Capsularum immaturarum succus concretus, capsulæ maturæ. Europe, Asia.*

The White Poppy is a native of the warmer regions of Europe and Asia; it also grows in colder climates without any diminution of its powers. The large capsule which it bears, affords, by incision in its cortical part, a milky juice, which, by exposure to the sun and air, becomes concrete, and of a brown colour. This is named Opium, and is the product of the plant that is chiefly medicinally employed. The leaves and stalks afford by expression a juice which is narcotic, but of inferior strength; the seeds contained in the capsule are bland and inert. Opium has been obtained in this country of full narcotic power from the Poppy, but at an expense which does not admit of the cultivation of the plant. It is usually imported from Persia by the way of Turkey and Syria, and an inferior kind used to be imported from the East Indies. It is obtained by a simple method. When the capsule has nearly attained maturity, a longitudinal incision is made in its side, care being taken that it does not penetrate into the cavity. This is done in the evening; the milky narcotic juice exudes, apparently from the vessels of the bark of the capsule; it adheres to the sides of the incision; is collected in the morning, and a large quantity being procured from a field of poppies, it is inspissated by exposure to the sun.

The opium of commerce is in flat or rounded masses, which, when cut, present a substance soft and tenacious, of a dark reddish-brown colour, having a strong odour somewhat fetid, and a taste bitter and

* *Incompatible Substances.* Camphor is not affected by any substance with which we can combine it. Paris.—B.

acrid. If kept in a dry place it becomes hard, but it retains its brown colour, and its fracture presents a resinous appearance. It also softens when pressed in the hand. These are the properties of what are named Turkey Opium, the kind met with in the shops. If hard, brittle, and of a grey colour with black spots and no lustre, it is of inferior quality. What is sold by the name of East India Opium, is soft, of a blackish colour, has a fainter smell, and is much inferior in narcotic power.

Opium is highly inflammable : submitted to the action of alcohol, a considerable portion of it is dissolved, and water likewise dissolves it in part. The solution in alcohol is more highly impregnated with dissolved matter than that in water ; and it possesses, in a much greater degree, the narcotic power. Diluted alcohol, composed of equal parts of alcohol and water, appears to dissolve all the active matter of opium ; the tincture prepared by this menstruum, when the due proportion of solvent is employed, being equal, or very nearly so, in power, to the quantity of opium submitted to its action. By boiling in water under exposure to the air, the narcotic power of opium is impaired ; this cannot be ascribed to the dissipation of any active volatile principle ; for when water is distilled from it, and condensed, it is found to have scarcely any narcotic quality : it must therefore be owing to changes produced at this temperature in the principles in which the activity of the opium resides.

In no instance have the researches of modern Chemistry been attended with more success than in the analysis of opium. By the interesting investigations of Sertuerner, Derosne, Seguin, and Robiquet, its composition has been accurately ascertained, and a peculiar alkaline principle pointed out, on which its properties more immediately depend, to which the name of Morphia or Morphine has been applied. The other principles contained in opium are narcotine, meconic acid, resin, mucilage, a matter analogous to caoutchouc, a portion of saline matter, and, lastly, the remains of vegetable fibre.

Morphia exists in opium in combination with meconic acid ; and several processes have been given for obtaining it in an insulated state. Robiquet prepares it in the following manner : 1000 parts of opium are to be macerated for several days, in about three or four times as much water, and the filtered solution boiled with 50 parts of pure magnesia for ten minutes. It is filtered again, and the residuum washed with water until it passes off clear ; afterwards treated alternately with hot and cold alcohol (specific gravity .920,) as long as this fluid takes up any colouring matter, and boiled for a few minutes in stronger alcohol, (specific gravity .850,) which dissolves the morphia, and deposits it in crystals as it cools. The magnesia decomposes the meconate of morphia, precipitating the morphia, while the meconate of magnesia remains in solution ; the weak alcohol removes a large portion of colouring matter, and the strong boiling alcohol dissolves the morphia, which is rendered still more pure by repeated crystallization.

Sertuerner used ammonia to precipitate the morphia, and this method is now again employed, and is said to have some advantage over that in which magnesia is used. Dr. Thomson has recommend-

ed a process of this kind, in which, after adding ammonia to a strong infusion of opium, the precipitated morphia is purified by solution in acetic acid, and digestion with animal charcoal; is again precipitated by ammonia, dissolved in alcohol, and by evaporation of the solution obtained in crystals. The morphia is obtained very pure, but not in so large a quantity as by the process of Robiquet.

Morphia when pure is colourless, sparingly soluble in boiling water, but abundantly so in alcohol and ether, dissolved in either of which it forms a very bitter solution; it possesses the usual properties of an alkali, restoring the colour of litmus when reddened by an acid, forming neutral salts with the acids, and decomposing the compounds of acids with the metallic oxides; it does not, however, form soaps with oils. It fuses easily, and crystallizes as it cools; exposed to heat in contact with the air, it is inflamed, and when decomposed by destructive distillation, a portion of carbonate of ammonia is obtained, indicating the presence of nitrogen. It consists, like other vegetable alkalis, of carbon, oxygen, hydrogen and nitrogen, but the proportions of these are not accurately ascertained. From the analysis of it by Mr. Brande, it may be supposed to consist of thirty-two atoms of carbon, six of oxygen, eighteen of hydrogen, and one of nitrogen; but so complicated a constitution is of course difficult to be determined, and it has even been denied by some that any nitrogen exists in it.

Pure morphia has little action on the animal economy on account of its insolubility; thus Orfila gave twelve grains of it to a dog with little effect, but when it is dissolved in alcohol, or by acids, its narcotic action is very powerful. Its salts are in general soluble and crystallizable, especially the acetate and sulphate. The acetate is a very active preparation, much more soluble than the meconate, and this explains why vinegar increases the action of opium.

Experience has proved that morphia produces a more purely narcotic effect than opium, and that its operation is not attended, in so great a degree, with those disagreeable consequences that accompany the exhibition of that valuable medicine. The nausea, debility, and other effects that follow the administration of opium, are supposed to be owing chiefly to the presence of another principle, named Narcotine. To obtain this principle, opium is treated repeatedly with boiling ether, and the solution evaporated until a saline crust is obtained, and a brown, bitter, acid liquor. Both these contain narcotine; from the former it is separated by dissolving it in hot alcohol, and precipitating it by ammonia, after having removed a little resin and caoutchouc, by means of rectified oil of turpentine, and washing the residuum with cold alcohol. The precipitate is then dissolved in muriatic acid, and precipitated again by ammonia. Narcotine is insoluble in water, but soluble in alcohol, ether, fixed oils and acids: it has no alkaline qualities.

Robiquet has proposed to free the extract of opium of this principle, by agitating it repeatedly with cold ether, after it has acquired the consistence of syrup. When prepared in this manner, it is said not to occasion the excitement which the common preparations of opium produce. Preparations of opium deprived of narcotine have

lately been employed by Dr. Hare, who found them to act as narcotics, with less unpleasant effect on the stomach and brain than accompanies the exhibition of opium in its common form.

The meconic acid, with which morphia is combined in opium, does not appear to possess any of the characteristic properties of opium.

The facts ascertained with regard to the action of the usual reagents upon opium, are of importance, as pointing out its proper pharmaceutic treatment. Diluted alcohol dissolving all its active matter, is the menstruum best adapted to its preparation under the form of tincture. Water can scarcely be employed with advantage. Vinegar dissolves its active matter, and increases its narcotic power, an acetate of morphia being formed. Any purification of opium, by dissolving it and evaporating the solution, only weakens its strength, and renders it uncertain.

The effects of opium on the system are those of a powerful narcotic. When given in a moderate dose, as that of one grain, to a person unaccustomed to its use, the pulse is soon sensibly increased in frequency, fulness, and force; if the dose is rather larger, this is accompanied with some degree of exhilaration, the different functions both of body and mind are performed with more vigour, and this state may rise even to intoxication and delirium. These effects, however, are transient; the pulse returns to its former standard, and it continues to fall both in frequency and force, but usually remains soft and full; a degree of lassitude and drowsiness is produced, sensibility to external impressions is impaired, so that pain, if present, is less severely felt, and after some time this diminished sensibility terminates in sleep: or if this does not happen, a state of languor and calmness comes on, and continues usually for some hours; the skin is warm and moist, the secretions are diminished, and there is generally some thirst. This stage of the operation is usually succeeded in those unaccustomed to its use by some degree of nausea or headach, and sometimes by tremors of the voluntary muscles; the peristaltic motion of the intestines is diminished, so that costiveness follows; the appetite and digestion are also impaired. The exciting operation of opium may continue nearly an hour, the sedative effect usually six or eight hours.

From a larger dose all these effects are produced in a more marked degree. In those particularly who are accustomed to its use, the exhilarating operation from such a dose is equal to, or exceeds that from wine, as is proved by the striking effects it produces on those who indulge in it habitually to excess among Mahommedan nations, where the established religion prohibits the use of wine; in those not accustomed to it, it is less evident, probably from the system not habituated to it being unable to bear the necessary dose; in both, however, the state of diminished sensibility and action quickly succeeds, the dulness and languor are greater, and sleep, sometimes approaching to stupor, is induced; when this terminates, thirst, headach, and nausea are urgent, vomiting frequently occurs, with tremors and general debility. If the quantity is still larger, the consequences are delirium, stupor, flushing of the countenance,

slow and stertorous breathing, an oppressed pulse, convulsions, and death.

From the topical application of opium to sensible and irritable parts, pain, increased muscular action, augmented heat, and even inflammation, are the first effects, but are ultimately succeeded by a greater insensibility to impressions, and a greater difficulty of being excited to contraction by the application of other stimulants. The latter state is also immediately produced by its application in a large quantity and concentrated state to the muscular fibre.

With regard to the nature of the action of opium on the living system, opinions have been maintained diametrically opposite. It was usually considered as a sedative, or substance, the operation of which is to depress the functions, and exhaust the powers of life. The theory was advanced by Brown, that its primary operation is stimulant, and that its apparent sedative effects are the consequences of the exhaustion of vital power, from the excess of stimulant action. The primary effects from its exhibition, so far as they can be actually ascertained, undoubtedly lead, by the least hypothetical induction, to the latter opinion. They are those of excitement, both of the vascular and nervous systems; and the state of diminished susceptibility and action which follows ought, in strict reasoning, to be considered as the effect of this, conformable to the general law of the animal economy, that excitement suddenly raised is followed by exhaustion of power. In its effects in a large dose the analogy of opium to other diffusible stimulants is also direct; and its action on the system in a diseased state appears to prove, not less clearly, its stimulant operation. In diseases of debility, its exhibition in a moderate dose produces the salutary effects resulting from the administration of wine and other powerful stimulants.

It is to be admitted, however, with regard to opium, that its apparent sedative effects, displayed in its lessening the sensibility to external impressions, diminishing action, and inducing sleep, are greater than are proportional to the excitement it raises, or to an equal or greater excitement produced by other stimulants, as by alcohol. This has been accounted for from the greater diffusibility, and less durability of its primary operation; in consequence of which, the excitement it produces is soon extended over the system, and is more quickly succeeded by the secondary state of diminished power. Whether this theory of its action be satisfactory or not, and whether it be regarded as a powerful stimulant, or as a direct sedative, it is to be observed, and the observation extends to analogous narcotics, that the practical application of it is nearly the same; since it is admitted that it may be exhibited so as to obtain from it stimulant and also depressing effects, and that the former are primary, and are obtained from it in a moderate dose, while the latter are secondary, and are only produced by a larger dose. Although, therefore, the explanation of the mode of operation be different, there is no dispute as to the operation itself, or the effects it produces.

Opium was at one time supposed to act on the system by the medium of the blood; but experiments have shewn, that its general effects are produced when the circulation is interrupted, that its ac-

tion is on the living solids, and is propagated to distant parts by nervous communication.

The principal indications which opium is capable of fulfilling, are, supporting the actions of the system, allaying pain and irritation, relieving spasmodic action, inducing sleep, and checking morbidly increased evacuations. It is differently administered, as it is designed to fulfil one or other of these indications. When given with the view of obtaining its stimulant operation, it ought to be administered in small doses, frequently repeated, and slowly increased, as by this mode the excitement it produces is best kept up. But where the design is to mitigate pain or irritation, or the symptoms arising from these, it ought to be given in a full dose, and at distant intervals, by which the state of diminished power and sensibility is most completely induced. It is principally with the latter views that it is employed in medicine; and in its usual medium dose, that of one grain to an adult, any stimulating effect from it is scarcely apparent, while its power of diminishing action, lessening sensibility, and inducing sleep, is sufficiently exerted. Nor can it, in any case, be given with much advantage as a stimulant. Its stimulant operation is even frequently prejudicial; and hence the general rule established with respect to the administration of opium, that it ought not to be given in any pure inflammatory affection, at least unless evacuations have been used, or unless means are employed to determine it to the surface of the body, and produce diaphoresis. Its sedative action has, however, been much praised of late, in inflammatory affections, by Dr. Armstrong, who generally gives a large dose of it after venesection, and repeats it again, if necessary.

In continued fever, not inflammatory, opium has been administered sometimes as a general stimulant; but its operation being less permanent than that of wine, and not so easily regulated, it is not so well adapted to obviate debility; or at least with this intention it is employed only as subsidiary to wine. It is more frequently used to diminish irritation, and lessen that state of increased susceptibility to impressions connected with debility, which frequently gives rise to restlessness, watchfulness, delirium, and spasmodic affections, particularly tremors and subsultus tendinum. A full dose is usually given at bed-time; and to obviate these symptoms, when they are urgent, it is farther occasionally administered, generally in combination with wine, in the course of the day. Its exhibition is improper, or requires to be conducted with much caution, where there is much tendency to inflammatory action, or to determination to the head. It then fails in lessening irritation or procuring sleep, and rather aggravates the inflammatory state, or gives rise to local inflammation. If it increase delirium, it is obviously injurious. An important practical rule is given by Dr. Currie,—that it is rather injurious than otherwise, when the heat of the surface is above the natural standard, and the skin is at the same time dry: but if the skin is becoming moist, it accelerates the change, and produces its other beneficial effects. Hence it is often used with advantage after this change on the surface has been obtained by the cold affusion, or by partial fomentation: it is also for the same reason often useful to delay its adminis-

tration in the evening, until the febrile exacerbation at that period begins to subside, and to give it therefore at a later hour. When it is repeatedly administered, it is necessary to guard against the constipation it is liable to produce.

In intermittent fever, the administration of an opiate, previous to the expected approach of the paroxysm, renders it milder, or sometimes prevents its attack; given even during the hot stage, it lessens its violence; and administered in either mode, it facilitates the cure by other remedies, the stimulant operation of which is less transient.

In the phlegmasiæ, the propriety of the employment of opium is, from its stimulant operation, more doubtful. Combined, however, with calomel, it has been lately administered with very great benefit in cases of active inflammation, the patient being previously bled. Where it is given so as to determine its action to the surface of the body, and produce sweat, it is often advantageously employed, particularly in rheumatism; or in some of the other diseases of this order, when the inflammatory stage has subsided, its exhibition is occasionally necessary to obviate symptoms connected with irritation.

In the exanthemata, opium is employed with similar intentions, and is often more peculiarly advantageous, by lessening the irritation connected with the eruption. In small-pox, it is useful with this intention after the eruption is completed, where it is copious; and if the concomitant fever be of the typhoid type, the same advantage is derived from it as in pure typhus; it is also useful in promoting the maturation of the pustules, and relieving the irritation on the surface. In measles, the state of the system being more purely inflammatory, its use is rather contra-indicated.

In hæmorrhagies, not connected with a state of plethora, or of high vascular action, opium is a valuable remedy, by removing that state of increased irritability whence the discharge frequently arises; it is thus employed more particularly in passive menorrhagia, and in the hæmorrhage which sometimes succeeds abortion or delivery.

In the profluvia, opium is employed with a similar intention. In dysentery, the propriety of its administration has been questioned, but evident advantage is derived from it when it is given in such doses as to relieve the pain and irritation which prevail; the constipation it might produce being obviated by the exhibition of mild purgatives usually employed in the treatment of the disease. The combination of it with calomel is more peculiarly useful.

In catarrh it proves of the highest utility, by obviating the irritation whence the cough arises; it requires, however, to be administered with some caution, where the disease is in its acute stage, and accompanied with an inflammatory state: it can then be given with more safety and advantage when combined with an antimonial, by which its direct stimulant action on the vascular system is obviated, and its operation is determined to the surface of the body. In phthisis it is given as a palliative and anodyne.

In spasmodic and convulsive diseases, opium is obviously indicated, and in many of them is the remedy of greatest power. In chorea, it has been advantageously employed; though the dependence of this disease on the accumulation of feculent matter in the in-

testines, as established by Dr. Hamilton's observations, suggests the necessity of its being employed with caution, and of its constipating effect being carefully guarded against. In epilepsy, it sometimes abates the violence of the paroxysm, especially where this is liable to recur during sleep; but as this disease so often depends on change of organic structure, the effects of opium can be those only of a palliative; where plethora is present it may be hurtful. In tetanus, to produce any relief, it requires to be given in very large doses, and these must be frequently repeated; and even then the system is often little affected by it; when pushed, however, to a great extent, the violence of the spasmodic affection has at length been overcome, and a cure obtained. A similar remark applies to hydrophobia, in which very large quantities of opium have been given without any sensible effect on the state of the functions, but in some cases with ultimate success, especially when combined with calomel. In mania, the system is in general little susceptible to the action of any medicine; but opium, when given in sufficient doses, is frequently useful in diminishing irritation, and producing composure or sleep. In other cases it altogether fails, when given in a very large dose, and sometimes it aggravates the restlessness and agitation of the patient; and when a plethoric or inflammatory state exists, its use must be hazardous. In the hysteric paroxysm, opium is often employed with advantage, either introduced into the stomach, or given under the form of enema. Its frequent employment to relieve the less urgent symptoms of hysteria is improper, as leading to the injurious consequences from its habitual use; and the same remark applies to its employment in hypochondriasis and melancholia. In purely spasmodic asthma, the paroxysm is shortened, and even sometimes cut short by a full dose of an opiate; and in all the varieties of dyspnœa, opium affords more or less relief. In colic, it relieves the violence of the pain, though its administration requires caution, where there is any tendency to an inflammatory state; and the constipation it is liable to produce requires also to be obviated. In cholera it is the principal remedy, and is given in moderately large and repeated doses, until the symptoms are subdued. In the cholera of India, it is considered as the only means of cure by some practitioners, while others give it in combination with calomel. In the progress of that disease in Europe, however, opium was found to be of little service. In diarrhœa it speedily checks the evacuations, and the precaution is hence necessary, not to use it too freely, until all acrid matter, or substance exciting irritation, has been discharged. In pyrosis, a moderate dose generally affords temporary relief; and it also frequently succeeds in checking vomiting from morbid irritability of the stomach.

Opium is given to relieve the pain of gastrodynia, and that attending icterus; and in that form of jaundice depending on calculus of the biliary ducts, by lessening irritation and relieving spasm, it promotes the discharge. It is given on the same principle to relieve the pain, and promote the discharge of urinary calculus. In syphilis, it is employed, principally with the intention of alleviating the irritation arising from the operation of mercury; for there is no suffi-

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cient evidence for the opinion which has been advanced, that it is possessed of anti-syphilitic power. Considerable advantage is derived from its use in extensive venereal ulceration; as well as in the treatment of painful and irritable ulcers, not connected with a venereal taint. It is given as a stimulant to check the progress of gangrene, and frequently with marked advantage, as well as to relieve those spasmodic symptoms, and that state of irritation which accompany gangrene, or the injuries from which it arises. It has been lately used with advantage in diabetes.

In many other cases of morbid affection, opium is had recourse to merely to lessen irritation, relieve pain, or induce sleep. As a palliative and anodyne, it is indeed the most valuable article of the Materia Medica, and its place could scarcely be supplied by any other.

Externally applied, opium alleviates pain and spasmodic action. Applied by friction, it was known to relieve the pain of cramp, and even of tetanus; and rubbed over the abdomen, to alleviate spasmodic pain of the stomach and intestines. From recent observations by some of the continental physicians, which have been confirmed in this country, it appears that this mode of employing it admits of more extensive application, and even in general affections of the system. It has succeeded in reducing the violence of the paroxysm of mania, and in relieving the delirium of typhoid fever, removing irritation and inducing sleep; and much advantage has been derived from this application of it in some forms of dysuria, in cholera and hysteria. In trismus, either hysterical or arising from other causes, relaxation of the spasm has been obtained from opiate friction. Dr. Percival employed for this purpose a liniment, in which opium is triturated with half its weight of camphor, to render it smooth, and this is mixed with a little lard: a quantity requires to be rubbed in, containing from 6 to 9 grains of opium, to obtain its action on the general system. According to Mr. Warde's observations, the tincture of opium is preferable, as producing more speedy and certain effects; from 3 to 6 drachms of it being employed, according to the severity of the symptoms, and being rubbed on the sides of the arms, until the whole is absorbed. This mode of application has the advantage of avoiding the action of opium on the stomach and intestinal canal.

By local application, opium relieves the pain of toothach, a little of it being introduced into the cavity of the affected tooth, or the gums being rubbed with laudanum; sometimes even it succeeds when applied to the temple or cheek. Under the form of enema, it is of singular efficacy in relieving tenesmus, and that painful affection of the prostate gland, which is sometimes the consequence of the discharge in gonorrhœa having been suddenly checked; and also that irritable state of the neck of the bladder, which renders the discharge of urine painful. It is used under the same form in diseases where it cannot be introduced into the stomach. A very dilute watery solution of it injected into the urethra has been used to relieve *ardor urinæ* in gonorrhœa; and a few drops of the vinous

infusion introduced beneath the eye-lids, is of much efficacy in some forms of ophthalmia, where the active inflammation has ceased.

The dose of this narcotic is very various, according to the state of disease, and the intention with which it is administered. One grain is the medium quantity to a person unaccustomed to its use; but to remove the symptoms from irritation, or relieve pain, it often requires to be given in a larger quantity. Its stimulating operation is principally obtained by frequent repetition of small doses; its sedative effect by a larger dose, repeated, if necessary, at greater intervals. Its power on the system soon becomes weaker, and from habitual use is so much impaired, that very large doses are required to produce its usual effects. There are instances of persons being in the habit of taking two or three drachms of it daily, without its producing more effect than as many grains on one unaccustomed to it.

In some diseases, too, particularly mania, diabetes, tetanus, and hydrophobia, it produces little sensible effect, unless the dose be very large. In the last disease it has been taken to the extent of two drachms in twelve hours, without abating the violence of the symptoms. Lastly, the operation of opium is much varied by idiosyncracy, the same dose producing very different effects on different individuals. Too small a dose of opium is liable to produce restlessness or disturbed sleep. The latter effect, with sickness and thirst, and sometimes delirium, are the consequences of a dose rather too large.

By the immoderate or long-continued use of opium, the vigour of the digestive organs is impaired; hence loss of appetite, wasting of the body, and muscular weakness; the nervous system, and even the functions of the mind, are affected; the patient is distressed with uneasy sensations, which are imperfectly relieved by other stimulants if opium is withheld, and at length fatuity and stupor are induced.

When such a dose of opium is taken, as would prove fatal if its effects were not obviated, the symptoms which usually occur are insensibility, so that the patient cannot be roused by any exertion,—a pulse slow and full,—deep and difficult breathing, with the countenance generally flushed: this state of stupor continues, sometimes with occasional convulsions, until it terminate in death. In such a case, the stomach pump should be immediately employed to withdraw the opium from the stomach, and if this be done there will be little cause for apprehension. If that instrument cannot be procured, an emetic, and that of the most powerful kind, should be given. Sulphate of zinc, or sulphate of copper, is generally used, dissolved in water, and introduced by a flexible tube into the stomach, the former in the dose of one scruple, the latter in a dose from five to ten, or even fifteen grains. The sulphate of copper is the most powerful, and if the other has failed, ought to be immediately given. In using either of them, if vomiting is not soon induced, the dose ought to be repeated. The powers of the stomach and of the general system may be roused and sustained by small doses of warm brandy, spirit of ammonia, and other stimulants; coffee has been said to have been taken with advantage: and the patient ought to be

kept awake, and, if possible, in a state of gentle motion, at least for some hours. Carbonate of potash may be given to precipitate the morphia, which, when not dissolved, is comparatively inert. It used to be the practice to administer large quantities of dilute vegetable acids, as of vinegar; but these rendering the morphia more soluble, are injurious as long as any opium remains in the stomach. Orfila found, that when opium was given to animals with vinegar, they died sooner than when it was merely diffused in water. When the opium, however, has been removed from the stomach, acids seem to act favourably, probably by their astringency restoring the tone of that organ.* To detect opium where it has been given as a poison, Dr. Christison recommends the contents of the stomach to be boiled with a portion of acetic acid to the consistence of a syrup, then boiled with strong alcohol, again evaporated, dissolved in distilled water, and the solution filtered. Subacetate of lead throws down the meconic acid, and this, mixed with sulphuric acid and permuriate of iron, gives the deep red colour of meconate of iron. By this test of iron, Dr. Hare detected laudanum where there were only ten drops of it in a gallon of water.

Opium is used either solid or under the form of tincture, twenty-five drops of the tincture being equal to one grain of crude opium. It is employed in the solid state when we wish it to act slowly on the stomach or intestinal canal, otherwise it is more convenient in the liquid form. There are, besides, various preparations, in which it is either the principal ingredient, or modifies the power of others, few of which, however, are of much importance. The officinal opiate electuary, powder, and pill, merely afford convenient forms for its exhibition. The powder of opium and ipecacuan is the composition under which it is usually employed as a sudorific. The ammoniated and camphorated Tinctures of Opium are the Paregoric Elixirs of the older pharmacopœias, forms under which opium has been principally used in catarrh. The troches of liquorice and opium are likewise designed to allay the cough in catarrh, by being allowed to dissolve slowly in the mouth. The Tincture of Opium and Soap, and the Plaster of Opium, are intended for external application. The Opium wine, besides its internal administration, is employed as a topical application to the eye in chronic ophthalmia.†

* One of the most efficient remedies, in the management of cases of poisoning by opium, is not mentioned in the text, and that is, *dashing cold water over the head.* This practice was first brought into general notice about the year 1822, and since then so many cases of its successful employment have been recorded as to leave no doubt of its efficacy. If properly used, and for a sufficient length of time, it restores sensibility, frequently brings on vomiting, and eventually saves life when every other remedy has been used in vain. A case illustrative of this was published by the writer, some few years since, in the New-York Medical and Physical Journal, vol. 3. p. 473. By Dr. Cross, of Alabama, an interesting essay has been published on poisoning by opium, in which he gives an account of a number of experiments made by himself upon dogs, to whom he gave large quantities of this drug, and after being reduced to a state of perfect insensibility, they were all recovered and restored to health by the continued application to their heads of cold water from the spout of a pump.—B.

† *Incompatible Substances.* Perchloride of mercury, nitrate of silver, acetate of lead, the alkalies, infusion of galls, and yellow cinchona.—B.

A preparation is in use under the name of the Black Drop, considered by some practitioners to possess peculiar advantages. It is a more concentrated preparation than the common tincture of opium, and requires to be given in not more than half the quantity. The following is the formula given for its preparation: Take half a pound of opium sliced, three pints of good verjuice, one and a half ounce of nutmegs, and half an ounce of saffron: Boil to a proper thickness, then add a quarter of a pound of sugar, and two spoonfuls of yeast. Set the whole in a warm place near the fire for six or eight weeks, then place it in the open air until it becomes a syrup, and, lastly, decant, filter, and bottle it up, adding a little sugar to each bottle. This preparation has been recommended chiefly from its not affecting the stomach and head so much as the other preparations of opium, and consists essentially of acetate of morphia. The Dublin College have introduced into their Pharmacopœia an Acetum Opii, as a preparation of a similar nature.

The acetate of morphia is sometimes given in a pure state, and is found to produce the narcotic effect of opium without being followed in so great a degree by nausea and headach. Battley's Liquor opii sedativus, which also possesses this advantage, appears to contain either a tartrate or acetate of morphia.* Citrate of morphia has been introduced into practice by Dr. Porter of Bristol, and Muriate of morphia by Dr. W. Gregory, and these, especially the latter, appear to be valuable remedies.

It has by some been affirmed, that the administration of the pure salts of morphia is not followed in any degree by the unpleasant feelings that succeed the exhibition of opium. This can scarcely be admitted. The derangement of the functions of the stomach, and effect on the nervous system, are the natural consequences of the action of any powerful narcotic, and experience fully proves that morphia is not an exception. But the narcotine which is present in opium seems to aggravate these *sequelæ*, and the abstraction of it is undoubtedly an advantage.

The preparations of morphia may be combined with other medicines, as ipecacuan and antimony, and with the same result of producing a modified action, as is the case with opium.

*Officinal Preparations.*—Elect. opiat. Pil. opiat. Pulv. opiat. Pulv. ipecac. et opii. Tinct. opii. Tinct. opii ammoniata. Tinct. opii camphorata. Tinct. saponis et opii. Troch. glycirrhiz. cum opio. Pil. saponis cum opio. Pulv. cornu usti cum opio. Pulv. cret. comp. cum opio. Conf. opii. Vin. opii. Acet. opii. Extr. opii. Emplast. opii. Extr. opii.

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The dried capsule of the poppy is sometimes employed for medicinal purposes. Its active matter is extracted by decoction with water; this evaporated, affords an extract similar to opium, but weaker, or it is made into a syrup, by boiling with sugar, which is used as an anodyne. This syrup is a weak preparation, and is in

* For some account of this preparation, the reader is referred to the notice of Empirical remedies at the close of this work.—B.

general only given to children. A decoction of the capsule is used as an anodyne fomentation.

*Offic. Prep.*—Extr. papav. somnif. Syr. papav. Decoct. papav.

HYOSCYAMUS NIGER. Henbane. *Pentand. Monog. Solanaceæ,* Linn. *Solaneæ,* Juss. *Folia, Semina. Indigenous.*

THE leaves of this plant, when recent, have a slightly fetid smell, and a mucilaginous taste; when dried, they lose both taste and smell, and their narcotic strength is in part impaired. The root possesses the same qualities as the leaves, and even in a more eminent degree, but it is liable to be more variable in strength. The seeds also are narcotic. The leaves only are medicinally employed; they afford a juice which possesses their narcotic power, and which inspissated forms an officinal preparation; they also yield their active matter to diluted alcohol; their active principle (Hyoscyama) is of an alkaline nature, forming neutral salts with the acids; it crystallizes in prisms, and is said not to be decomposed by exposure to a red heat.

Henbane has a greater analogy to opium in its action than any other narcotic has, particularly in the power of inducing sleep. In a moderate dose, it increases at first the strength of the pulse, and occasions some sense of heat, which are followed by diminished sensibility and motion; in some cases by thirst, sickness, stupor, and almost always by some affection of vision. In a larger quantity, it occasions profound sleep, hard pulse, and sometimes delirium; and in a dose which proves fatal, its operation soon terminates in coma, with a remarkable dilatation of the pupil, distortion of the countenance, a weak tremulous pulse, and eruption of petechiæ. On dissection, inflamed or gangrenous spots have been observed on the internal surface of the stomach, and the vessels on the membranes of the brain have appeared enlarged. Its baneful effects, like those of other vegetable narcotics, are best counteracted by a powerful emetic.

Henbane is one of the narcotics which has been longest known to physicians, having been employed by the ancients for mitigating pain, and restraining hæmorrhage. It had, however, fallen into disuse, until Dr. Stoërk of Vienna introduced it, with several other vegetable narcotics, to the notice of modern practitioners. He employed it in various spasmodic and painful diseases, as in epilepsy, hysteria, palpitation, headach, paralysis, mania, and schirrus. It was given in the form of the inspissated juice of the leaves. At present it is principally employed as a substitute for opium, having the advantage, that it does not, like it, produce constipation, but rather relaxes the bowels; it is, however, not equal to opium as an anodyne in procuring remission of pain or irritation, and producing that soothing state of languid ease. In some forms of mania, more especially puerperal mania, it has been supposed preferable to opium, either alone or in combination with camphor. Mr. Benjamin Bell has found the combination of extract of hyoscyamus with camphor useful in gonorrhœa to relieve chordee. He has prescribed, in the course of twenty-four hours, two scruples of the former with one drachm of the

latter. The solution of the extract of hyoscyamus is used to dilate the pupil of the eye, but is less effectual than belladonna.*

*Offic. Prep.*—Succ. spiss. hyosc. Tinct. hyosc.

Atropa belladonna. Deadly Nightshade. *Pentand. Monogyn. Solanaceæ*, Linn. *Solaneæ*, Juss. *Folia et radix.*

This is an indigenous herb, often growing in wastes and shady situations. Its leaves have scarcely any smell, and only a slightly nauseous, sub-acrid taste. The berries, which are purple, are sweetish. Both are highly narcotic, as is also the root, but the leaves are preferred for medicinal use, as being more uniform in strength. In a moderate dose belladonna occasions a sense of warmth, followed by diaphoresis, and a disposition to sleep, frequently with nausea and headach; in a larger dose, symptoms of intoxication, vertigo, sickness, and thirst; the pulse becomes low and feeble, the pupils are dilated, the face becomes swelled, vision is impaired, and these symptoms terminate in convulsions, coma, or paralysis. On dissection, where it has proved fatal, the stomach and intestines have been found inflamed or gangrenous, and the blood in a dissolved state. The remedies are a powerful emetic in a sufficiently large dose, purgatives, and dilution with the vegetable acids.

The leaves of this plant, according to Vauquelin, contain vegetable albumen, muriate, sulphate, binoxalate, nitrate, and acetate of potash; and M. Brandes lately detected an alkaline element in it, to which he gave the name of *atropia*; it forms distinct salts with the acids, and to it all the active properties of belladonna have been referred. To obtain this alkali, a small portion of sulphuric acid is added to a decoction of the leaves, by which some albumen and other vegetable matter is precipitated. Potash is then added in excess, precipitating a considerable quantity of atropia, which may be purified by dissolving it repeatedly in acids, and precipitating it again by potash. It is soluble in alcohol, but insoluble in water, ether, and oils. Its salts produce the same effect as the alkali itself, but they have seldom been examined, from the violent headach, nausea and vertigo which are produced even by the vapours that arise from them.

Belladonna was first employed as an external application, in the form of fomentation, to schirrus and cancer. It was afterwards administered internally in the same affections; and numerous cases in which it proved successful were given on the authority of the German practitioners. It has been recommended, too, as a remedy in extensive ulceration, in paralysis, epilepsy, mania, and hydrophobia, but with so little discrimination, that little reliance can be placed on the testimonies in its favour. It is affirmed, however, on good authority, to be serviceable in hooping cough; and, according to Dupuytren, in scrofulous ophthalmia. A singular property of belladonna has been asserted by continental physicians, that it protects those individuals who take it from the infection of scarlatina; there is,

* *Incompatible Substances.* Nitrate of silver, acetate of lead, and sulphate of iron. According to Dr. Thomson, alkalies and lime water impair its narcotic properties; and on this account he is inclined to give them the preference as antidotes over acids.—B.

however, some doubt as to this. It has a peculiar action on the eye, causing the pupil to dilate. Hence it is usual, before performing the operation for cataract, to rub the eyelids with an infusion of the leaves of belladonna ; within an hour or two after the pupil is found to be dilated, and the cataract brought fully into view. So far this is an advantage ; but on the introduction of the instrument, the pupil instantly contracts. The application of belladonna after the operation has also been recommended, to prevent adhesions of the iris. Advantage has been taken of the dilating action of belladonna, in cases of blindness occasioned by opacity of the centre of the lens, a little of the infusion of the leaves being dropped into the eye three or four times a-day, by which the pupil is expanded, light enters, and vision is restored ; and it appears that this practice may be continued for years, the effect of the belladonna not being diminished by use.

The internal administration of belladonna must be managed with caution, and intermitted whenever it produces tension of the throat, vertigo, or dimness of sight.

A belladonna plaster has been found to relieve neuralgia and chronic rheumatism.

*Offic. Prep.*—Succ. spiss. bellad. Emplast. bellad.

Aconitum napellus. Aconite, Monks-hood, or Wolfsbane. *Poly-and. Trigyn. Multisiliquæ*, Linn. *Ranunculaceæ*, Juss. *Folia. Europe, America.*

The aconite, which has been medicinally employed, is regarded by De Candolle, not as the aconitum napellus, but the aconitum paniculatum ; and this has been admitted, on his authority, by the Dublin College, while the other is retained by the London College. The smell of its leaves, when recent, is narcotic, but is lost by drying. Their taste is sub-acrid. In a moderate dose its effects are those of a narcotic, accompanied with slight diaphoresis ; in a larger dose it occasions vertigo, syncope, paralysis, and convulsions : when it is dried, its strength is liable to variation. Its medicinal virtues are supposed by M. Brande to depend on a vegetable alkali, to which he has given the name of Aconita.

Aconite was employed by Stoërk in chronic rheumatism, exostosis, paralysis, ulceration and schirrus. Though highly praised, it has fallen almost entirely into disuse. Its dose is from one to two grains of the dried leaves ; of the inspissated juice half a grain, this dose being gradually increased : it is chiefly in obstinate chronic rheumatism that a trial is sometimes made of it in modern practice. Dr. Duncan states that he has found it useful in sciatica.

*Offic. Prep.*—Succ. spiss. aconiti.

Conium maculatum. Hemlock. *Pentand. Digyn. Umbelliferæ*, Linn. Juss. *Folia, Semina. Indigenous.*

This plant, which grows abundantly in this country in waste ground, is of the umbelliferous kind. It is distinguished from other similar vegetables by its large and spotted stalk, by the dark green colour of the lower leaves, and by its peculiar faint disagreeable smell, which becomes more perceptible in the leaves when they are bruised. The seeds have a fainter odour, and are inferior in power.

The root has similar powers, but varies in strength at different seasons. The leaves are therefore preferred for medicinal use. Orfila found the extract, prepared by boiling the dried powder in water, and evaporating, to be perfectly inert, as the active principle of the plant resides in a resinous element, insoluble in water. According to Dr. A. T. Thomson, the active matter of hemlock may be procured in an uncombined state, by preparing an ethereal tincture from the leaves, and evaporating it on the surface of water. Half a grain of the matter thus obtained caused vertigo and headach. He conceives it to be a resinous principle ; as it exhibited, however, the colour, taste, and smell of the plant, it was probably mixed or combined with other elements ; it has since received the name of *Coneine*.

Hemlock is a powerful narcotic. Even in a moderate dose it is liable to produce sickness and vertigo ; in a larger dose it occasions permanent sickness, with great anxiety, dimness of vision, delirium, convulsions, and coma. The use of it was confined to external application, until it was introduced by Stoërk, principally as a remedy in schirrus and cancer ; and in these diseases it is undoubtedly beneficial. It cannot, indeed, effect a cure, but as a palliative it is very serviceable ; it relieves the pain, and corrects the discharge more effectually than opium, and it is not liable to occasion constipation. And, when opium is employed, hemlock is a valuable auxiliary, as it renders a smaller quantity of the former necessary.

Benefit is derived frequently from hemlock in other cases of extensive ulceration, particularly in those connected with a scrofulous taint ; it promotes the operation of mercury in healing venereal ulcers, and it is useful in those forms of ulceration which arise under the action of mercury, and which are aggravated instead of being removed by its protracted use ; occasionally, too, it seems to contribute to the removal of glandular obstruction and induration. It is recommended in hooping cough ; and Dr. Paris states, that combined with hyoscyamus, it affords relief in phthisis, and alleviates the cough which sometimes continues in patients who have suffered from pleurisy.

Hemlock is given either under the form of the inspissated juice, or of the dried leaves, in a dose of two or three grains of either daily. The dose requires to be increased, and that more quickly, and to a greater extent, than is the case with almost any other substance in the Materia Medica, so that at length it has been taken to the extent of a number of drachms in the course of the day. The inspissated juice is of very uncertain strength, and even the powder of the dried leaves varies.*

*Offic. Prep.*—Succus. spiss. conii. Tinct. conii. Unguent. conii. Cataplas. conii.

Digitalis purpurea. Foxglove. *Didynam. Angiosperm. Solanaceæ*, Linn. *Scrophulariæ*, Juss. *Folia.*

This indigenous plant grows on dry elevated situations, and, from the beauty of its flower, has often a place in our gardens. All the

* *Incompatible Substances.* The vegetable acids counteract the effects of conium. —B.

parts of it are powerfully narcotic, but the leaves being most uniform in strength, are preferred for medicinal use. They are large and oblong, of a green colour, rather dark, have little smell, and a bitter somewhat acrid taste. They are collected when the plant is in blossom, and are dried before a gentle fire, the thicker stalks being removed; and they ought to be kept without being reduced to powder. Water, alcohol and ether extract their active matter by infusion; it is analogous in its properties to the other vegetable alkalis, and has been named Digitalia. It is a brown-coloured substance, extremely bitter, and highly poisonous.

The operation of digitalis on the system is very peculiar, and there is even considerable difficulty in ascertaining its real effects. From a small dose there is little sensible effect, until after its continued administration. In a full dose, it produces exhaustion of power, marked by a great and sudden reduction in the force of circulation; the pulse being reduced both in frequency and force, falling sometimes from 70 to 40 or 35 beats in a minute, and being small, tremulous, and often intermitting. This is accompanied with sickness, a sense of faintness, vertigo, dimness of vision, and, in a large dose, with vomiting, syncope, convulsions, and coma, with sometimes a fatal termination. Yet these effects are not uniform; but from the same dose there is considerable diversity of operation in different individuals: the pulse is rendered slower, without being diminished in fulness; at other times it is rendered irregular. Effects are even observed from the operation of foxglove, apparently of a very opposite kind. While it reduces the force of the circulation, it appears to increase the action of the absorbent system, and hence it proves a powerful remedy in dropsy; and Dr. Withering, by whom its powers were first particularly investigated, observed, that when given in a state of disease, it was most successful, not where there existed increased action in the system, but, on the contrary, in states of debility, where the pulse was feeble and intermitting, and the countenance pale. Other authors have remarked its apparent stimulant operation: and Dr. Sanders, from a series of observations and experiments, has inferred, that it always acts primarily as a stimulant, augmenting, when given in a dose not too large, the force and frequency of the pulse, and inducing a state of increased action; it is only when the dose is too large, or when it is accumulated by repetition, that reduction of the force of the circulation, and other symptoms of diminished power, are produced; and hence, according to this view, it is analogous in its operation to other narcotics.

It must be admitted, however, that it is more difficult to regulate its administration so as to obtain its continued stimulant operation, than it is with regard to other stimulants; that there is a rapid transition to a state of diminished action; and that this is greater, and more permanent, compared with the primary stimulant effect, than in other stimulants, even of the most diffusible kind.

Foxglove, producing very different effects, according to the mode in which it is administered, or according to the state of the system, is employed as a remedy in different diseases. It has been supposed to prove useful in phthisis by counteracting the state of increased

action which prevails in the incipient stage of the disease; and by diminishing the rapidity of the circulation through the lungs, it may facilitate the removal of the local affection. In the more advanced stages, it may operate, it has been conceived, by promoting absorption, thus removing the tuberculous affection, or withdrawing the purulent matter before it has been rendered acrid by the action of the air. Sanguine expectations were at one period formed of the advantages to be derived from it in the treatment of phthisis, many of the symptoms disappearing under its use, and the progress of the disease appearing to be arrested. The change of organic structure is, however, so considerable, at least in the advanced state of the disease, as scarcely to admit of a cure from the operation of any remedy; and in the earlier stages, where some degree of inflammatory action exists, it is difficult to give digitalis so as to reduce the force of the circulation, and continue this effect, without inducing other consequences, which compel us to relinquish its use.

From its power of reducing the force of the circulation, foxglove is a remedy of much power in active hæmorrhage; and according to the observations of Ferrier and others, it may be employed with signal advantage in epistaxis, hæmoptysis, and menorrhagia, either alone or with opium. It is, on the same principle, useful in aneurism to reduce the impetus of the blood.

In spasmodic asthma, the combination of it with opium has afforded much relief. In palpitation arising from intemperance, or from passions of the mind, and not connected with dyspepsia, the irregular action of the heart has been abated, and at length removed by its operation. Generally in diseases of the heart it is useful.

Foxglove is given in substance, or under the form of infusion, or tincture. The tincture is the form under which it has usually been given as a narcotic; the infusion, that in which it has been employed as a diuretic. When it is given in substance, there is supposed to be more risk of its effects accumulating from repetition of the dose, so as to induce the unpleasant symptoms which arise from an over-dose.

To obtain the full narcotic operation of foxglove, the dose given at first requires to be gradually increased, but this increase must be made with much caution, not only from the hazard attending an over-dose, but from the circumstance that the action of the remedy is for a time not apparent; but if the dose is too quickly increased, or repeated at intervals not sufficiently distant, it appears suddenly, and continues progressive. Hence the necessity of the practitioner's watching with the greatest attention the effect it produces. If the dose given at first is small, the augmentation may proceed at the rate of from one-eighth to one-fourth of the original quantity every second day, and the dose should not be repeated more than twice, or at farthest thrice a-day, unless in acute diseases, where the effect must be more speedily obtained, and where, therefore, the augmentation must be more rapid. The administration of the remedy is continued until the effect intended to be obtained is produced, or until its operation is apparent on the system; whenever the pulse begins to diminish in frequency or force, the increase of dose must be stopt;

and if the reduction be considerable, or proceed rapidly, the administration must be suspended, and only, after a sufficient interval, cautiously renewed. This is more especially necessary when the pulse becomes intermitting, or when nausea is induced, with dimness of vision, vertigo, or any tendency to fainting. When these symptoms do occur, they are best obviated by small doses of stimulants, warm wine, brandy and water, with aromatics, ether, and spirit of ammonia; some have recommended strong bitter infusions, small doses of opium, and a blister applied to the region of the stomach. The patient should avoid making any quick muscular effort.

The infusion of foxglove has been applied externally as an anodyne lotion to painful cutaneous eruptions, or ulceration. An ointment composed of the powder mixed with lard has been found successful in obstinate tinea capitis.

The application of foxglove, as a diuretic, will be considered under the class of diuretics.*

*Offic. Prep.*—Infus. digit. Tinct. digit.

Nicotiana tabacum. Tobacco. *Pentand. Monogyn. Solanaceæ,* Linn. *Solaneæ,* Juss. *Folia. America.*

This plant, though cultivated in this country, is usually imported from America. Its leaves, which are of a large size, are of a light green colour, which they retain with little change when dried; but in the usual preparation to which they are subjected, they are rendered brown by the action of a little sulphate of iron. Their smell is fetid, their taste extremely bitter and acrid. They deflagrate in burning, from a quantity of nitre they contain. Their active matter is extracted both by water and by alcohol; by decoction its activity is much impaired. The essential oil obtained from them by distillation is very highly narcotic, so that when introduced into a wound, or injected into the rectum, it occasions instant death. Vauquelin obtained from tobacco a peculiar acrid principle, which he named Nicotin; it has the odour of tobacco, is volatile and highly narcotic.

Tobacco operates as a very powerful narcotic. This is apparent even in the common practices of smoking and chewing it, though its effects, like those of other narcotics, become less powerful from continued use. In a person unaccustomed to it, or in an over-dose, it excites severe and permanent sickness, with vomiting, reduces the force of the circulation, and occasions severe muscular debility, with insensibility cold sweats, and convulsion.

As a diffusible stimulant, the smoke of tobacco, thrown into the rectum, was at one time employed in the recovery of drowned persons,—a practice proved to be prejudicial, and now exploded. The same practice is occasionally employed in ileus and incarcerated hernia; in the former disease, with the view of removing the constricted state of the intestines; in the latter, with the intention of

* *Incompatible Substances.* Acetate of lead, sulphate of iron, and the infusion or decoction of yellow cinchona, when added to the infusion of digitalis, throw down precipitates. According to Dr. Thomson, the alkalies are also incompatible with it. With the tincture, the bichloride of mercury and nitrate of silver are also incompatible.—B.

producing that state of muscular relaxation which may favour the reduction of the protruded intestine. Though not without hazard, it has sometimes proved successful. The watery infusion of the strength of one drachm of the dried leaves to a pound of tepid water is a more convenient form of employing it than the smoke, as an enema: and even the infusion of this strength has sometimes produced alarming symptoms of exhaustion. Unless it be used, however, in such a state of activity, as to produce some degree of muscular debility, no advantage can be derived from it; and the practice is therefore only to be had recourse to, where other methods have failed. It has lately been much recommended in the form of an enema, in tetanus and dysentery, by Dr. O'Brien of Dublin. The smoke of tobacco received into the mouth relieves the pain of toothach, either by its narcotic power, or by exciting a profuse salivary discharge. It sometimes too, by its action on the lungs, relieves the paroxysm of spasmodic asthma. The powder is in common use as an errhine. The medicated wine, given in small doses, acts as a diuretic, and has been used with much success in dropsy and dysuria. The leaves, bruised or moistened, have been employed as a fomentation or cataplasm in tinea capitis, and in various cutaneous eruptions; incautiously applied, they have sometimes occasioned the violent effects which arise from the internal administration of tobacco in too large a dose.*

*Offic. Prep.*—Vin. tab. Infus. tab.

LACTUCA VIROSA. Strong-scented Lettuce. *Syngenes. Polygam. æqual. Compositæ Cichoraceæ*, Juss. *Folia. Indigenous.*

THE leaves of this plant have a strong fetid smell, similar to that of opium, and yield a white acrid juice, in which their activity resides. Though narcotic, they have been used principally from their diuretic power in the treatment of dropsy, under the form of the inspissated juice. By the German practitioners, by whom this plant has been recommended, it has also been used in palpitation of the heart, and intermittent fever.

*Offic. Prep.*—Succ. spiss. lact. vir.

LACTUCA SATIVA. Garden Lettuce.

THIS species of lettuce is generally cultivated, and from the leaves and stem of it, which contain a pellucid colourless juice, an extract is obtained. This juice is somewhat of a milky appearance, but, upon exposure to the atmosphere, it assumes a brown hue. Lactucarium, as the extract has been named, resembles opium in taste and odour, as well as in narcotic properties; and from analysis it appears to contain a narcotic principle analogous to morphia. It was proposed by Dr. Cox of Philadelphia as a substitute for opium; and Dr. Duncan, sen. to whom we are more particularly indebted for its introduction among us, from a very extensive and accurate observa-

* *Incompatible Substances.* The best antidote to the poisonous effects of tobacco is some astringent vegetable infusion, such as that of gall nuts. By this, the active principle of the tobacco is precipitated in its uncombined state, in which form it is very nearly insoluble.—B.

tion of its narcotic effects, recommends it as highly beneficial in allaying the cough accompanying phthisis pulmonalis. Many other medical men have confirmed its utility in similar cases.

*Offic. Prep.*—Succ. spiss. lactuc. sat.

DATURA STRAMONIUM. Thorn-apple. *Pentand. Monog. Solanaceæ,* Linn. *Solaneæ,* Juss. *Herba, Semina.*

THORN-APPLE is an indigenous herb, the leaves of which have a narcotic odour and bitter taste. They possess the powers of a narcotic, producing, when taken in too large a quantity, vertigo, sickness, delirium, and convulsions. Cases are mentioned of individuals, who, from eating this plant, became maniacal, and died in that state. Vinegar is recommended as the best antidote against these poisonous qualities. An alkaline narcotic principle has been discovered in this vegetable, hence named Daturia. It exists chiefly in the seeds, from which it can be obtained in small crystals, soluble in alcohol; it forms crystallizable salts with acids.

With other plants of the same family stramonium was made the subject of clinical experiment by Stoërk; and it was recommended by him as a remedy in convulsive diseases, especially in epilepsy and in mania. Its exhibition in the latter disease was suggested by the inference, that as it deranged the intellect of the sane, it might possibly correct that of the insane.

The form in which it has been given is that of the inspissated juice of the leaves, the dose of which is from one-half to three grains twice a-day, gradually increased. The herb, or the root smoked like tobacco, has been found to afford relief in the paroxysm of spasmodic asthma. The smoke is drawn into the lungs as fully as possible, from a common tobacco pipe, continuing the smoking until the quantity is consumed, and repeating this occasionally, and frequently, if necessary. It often excites some degree of vertigo, usually promotes expectoration, and relieves the cough, dyspnœa, and spasmodic irritation; sometimes it is hurtful, and in patients liable to apoplexy, has appeared to induce that disease.*

*Offic. Prep.*—Extract. stram.

ARNICA MONTANA. Leopards-bane. *Syngenes. Polygam. superf. Compositæ Corymbiferæ,* Juss. *Flores, Folia, Radix. Germany.*

THE flowers of this plant have a smell slightly fetid, and a penetrating bitter taste; both taste and smell are extracted by maceration in water. In their action on the system, their stimulating power is apparent, along with their narcotic action; they increase the force of the vascular system, and appear to communicate tone to the muscular fibre. In a larger dose they produce vomiting and purging, sometimes followed by muscular pains, vertigo and convulsions.

* *Incompatible Substances.* The salts of iron, silver, lead and mercury, cause precipitates from the infusion of stramonium. In cases of poisoning by this drug, acetic acid must be used with the same precautions as in poisoning by opium. If administered before the stomach is completely evacuated, it increases the energy of the poison by dissolving its active principle. Its use should, therefore, in all cases be delayed until this preliminary process has been accomplished.—B.

Dupuytren has shewn that the emetic action is owing to downy particles from the plant, which diffuse themselves through the infusion. In amaurosis, paralysis, convulsive disorders, gout and rheumatism, the infusion has been used with some advantage ; its dose is half a drachm. The root of arnica is aromatic and tonic, and has been used as a substitute for Peruvian bark.

RHODODENDRON CHRYSANTHUM. Yellow-flowered Rhododendron. *Decand. Monogyn. Bicornes,* Linn. *Ericineæ,* Juss. *Folia. Siberia.*

THE leaves of this shrub are destitute of smell, but have a bitter, rough, and sub-acrid taste, which they communicate to water by infusion or decoction. They are stimulating and narcotic, and occasion in a small dose increased vascular action ; in a large dose, nausea, vomiting, intoxication and delirium. They have been employed in chronic rheumatism and gout, their application in the former disease having been derived from the practice of the natives of Siberia. Their power is said to be marked by a sensation of creeping in the skin, and by diaphoresis being induced. The form in which they have been given is decoction, 2 drachms being boiled in 10 ounces of water, and 1 or 2 ounces of the strained liquor being given twice a-day, and gradually increased.*

RHUS TOXICODENDRON. Poison Oak, or Sumach. *Pentand. Trigyn. Dumosæ,* Linn. *Terebinthaceæ,* Juss. *Folia. North America.*

THIS plant has so much acrimony, that the touching of the leaves, or rubbing them on the skin, occasions itching, inflammation and desquamation ; if taken internally, nausea, vertigo, and pain in the head are produced ; according to Van Mons, the acrid matter of the plant is disengaged at night in combination with carburetted hydrogen ; the gas, when collected, acting on the skin in the same manner as the plant itself. The dried leaves have been used in paralysis, in some cases related by Mr. Alderson, with marked advantage. The dose given was half a grain twice or thrice a-day, gradually increased to three or four grains daily. It excited a sense of heat and irregular motions in the parts affected.

HUMULUS LUPULUS. Hop. *Diœcia. Pentand. Scabridæ,* Linn. *Urticeæ,* Juss. *Strobili. Indigenous.*

THIS plant is cultivated in England, its strobiles being used to give bitterness to fermented malt liquors. They are picked off when ripe, and are dried by artificial heat. They have an odour somewhat fragrant and aromatic, and a taste very bitter, with some astringency. The characteristic properties of the hop reside in a

* The experiments made, many years since, by Dr. Home of Edinburgh,† while they show this article to possess some curious and valuable properties, by no means confirm its efficacy as a remedy in rheumatism. Possibly this difference of effect may be explained by the long keeping of the plant, in being brought from its native climate, imparing its virtues.—B.

† Clinical experiments, histories and dissections. By Francis Home, M. D. p. 145.

pulverulent substance, which may be separated from it by sifting, and which forms about a sixth part of its weight. It has been named Lupuline, is of a yellow colour, with an agreeable aromatic odour and a very bitter taste. Besides this, the hop appears to contain resin, extractive matter, mucilage, volatile oil, tannin, and an ammoniacal salt. Along with its bitterness it has a narcotic power; of this the popular remedy, sometimes successful, of a pillow of hops to procure sleep in the delirium of fever and in mania, is a proof. It accordingly, when given internally in a full dose, reduces the frequency of the pulse, and procures sleep. It has been employed as an anodyne, principally in rheumatism and in the paroxysm of gout, either in substance in the dose of three grains, or under the form of tincture in the dose of from half a drachm to a drachm, once or twice a-day. An extract prepared by inspissation of its decoction is also given in a dose of five or seven grains. An over-dose occasions headach and vertigo. A cataplasm or ointment, prepared from it, has been used as an anodyne application to cancerous sores; and a fomentation of the strobiles has been used in the same case, and as an application to painful tumours. Similar preparations of Lupuline have been found useful, as containing in a concentrated form the virtue of hops. One part of Lupuline has the same effect as ten parts of leaves. An ointment composed of one part of Lupuline and three of lard is said to give some relief in the last stage of cancer.*

*Offic. Prep.*—Tinct. humul. Extr. humul.

STRYCHNOS NUX VOMICA. Vomica Nut. *Pentand. Monogyn. Salamancæ*, Linn. *Strychneæ*, Juss. *East Indies.*

THE kernel of the fruit is the part of this plant that is powerfully narcotic; its taste is intensely bitter; it has little or no smell, and is so hard that it cannot be reduced into powder by beating, but requires to be filed down. Its narcotic operation is well exemplified in the effect it produces when given as a poison to dogs and other animals. It occasions extreme anxiety, paralysis of the hinder extremities, convulsions, and death; and on dissection, no marks of local affection are to be discovered in the stomach. In small quantity it exerts a stimulant action, and even produces intoxication.

In analysing this substance, MM. Pelletier and Caventou discovered a peculiar proximate principle, of an alkaline nature, in which the activity of the medicine resides; they have named it Strychnia. It crystallizes in small four-sided prisms, is soluble in alcohol, but very sparingly so in water. Its taste is somewhat metallic and intensely bitter, perceptible even when one part of strychnia is dissolved in 600,000 parts of water; it forms salts with acids, which are powerful poisons. Strychnia exists also in the Upas Tieute, Strychnos Ignatia, and Strychnos Colubrina.

The narcotic action of nux vomica is of a peculiar kind. It acts powerfully on the spinal chord, causing tetanic spasms, while the brain is not affected by it. From remarking this the idea was sug-

* *Incompatible Substances.* The salts of lead, mercury, iron, zinc and silver.—B.

gested by M. Fouquier, that it might restore nervous energy in cases of partial paralysis depending on the state of the spinal marrow; and the administration of it in such cases has proved very successful. Its beneficial action in these cases is announced by a creeping feeling in the paralysed part and a local perspiration. Convulsive movements are produced in the paralysed muscles, while the healthy parts are not affected, and in a number of instances a complete cure has been attained. It is less decidedly successful in hemiplegia. In palsy of the bladder and of the sphincter it has been employed with much advantage, and equally so in the cure of dysentery.

Nux vomica is given in the form of alcoholic extract or of tincture, the first in a dose of one or two grains, the other of five or ten drops several times a-day. Strychnia in a pure state may be given in doses of the tenth or twelfth of a grain.*

PRUNUS LAURO-CERASUS. Cherry Laurel. *Icosand. Monog. Pomaceæ*, Linn. *Rosaceæ*, Juss. *Folia. Europe.*

THE leaves of this plant have an odour slightly fragrant, their taste is extremely bitter, and they possess narcotic power, qualities due to a portion of prussic acid which they contain. Water distilled from the leaves carries over with it an impregnation of the acid, and this distilled water, now made officinal by the Dublin College, has been used with considerable benefit as a sedative. It is even preferable to the pure prussic acid, as being not so liable to decomposition. In spasmodic cough, palpitation, and tic doloureux, it has been given with advantage. The dose of laurel water is from half a drachm to a drachm. In a larger quantity it produces the noxious effects of prussic acid; yet in Paris, Fouquier and Richard gave repeatedly upwards of twelve ounces in one day, with no perceptible effect, a circumstance probably to be explained by the medicine not being well prepared.

A cataplasm prepared from the leaves has been used as an anodyne to painful tumours and ulcers. An essential oil is procured from the leaves, which is made use of to give the flavour to the spirituous cordial *Noyau*, a practice which has sometimes occasioned fatal accidents.

AMYGDALUS PERSICA. Peach. *Icosand. Monog. Pomaceæ*, Linn. *Rosaceæ*, Juss. *Folia. Europe.*

THE blossoms, leaves, and kernels of the fruit of the peach tree contain prussic acid, as is proved by their odour, and some degree of narcotic power which they possess. The leaves are made officinal in the last Dublin Pharmacopœia, an infusion of them having been found useful in irritability of the urethra and bladder. The infusion is prepared by digesting half an ounce of the leaves in a pound of boiling water; it is given in the quantity of a table-spoonful twice or thrice in a day.

* M. Donné, of Paris, has recently ascertained, by experiments upon animals, that in cases of poisoning by the strychnia, the best antidote is the tincture of iodine. To be successful, however, its use should not be delayed longer than ten minutes after taking the poison.—B.

Cocculus suberosus. Cocculus Indicus. Jagged Moonseed. *Diœcia. Dodecand. Menispermeæ*, Juss. *Fructus. India.*

The berries commonly known by the name of Cocculus Indicus are referred by the Dublin College to the Cocculus Suberosus, a shrub which grows on the Malabar coast. They have an intensely bitter taste, and exert a narcotic power, from the presence of an alkaline principle which has been named picrotoxia. It may be obtained crystallized in prisms, white, bitter, and highly narcotic. Cocculus Indicus is used in India to poison fish, and in this country it is said to be employed in brewing, to communicate bitterness, and a degree of intoxicating power to ale and porter. In medicine it is used in the form of an ointment made with lard in tinea capitis, and to destroy vermin. An ointment of lard and picrotoxia has also been employed with advantage in tinea capitis.

# CHAP. III.

## ANTISPASMODICA—ANTISPASMODICS.

It is not easy to assign precisely the differences in kind of action between Narcotics and what are named Antispasmodics. The effects they produce are similar; they are capable of exciting the actions of the system, and they are often equally powerful in allaying pain and inordinate muscular action. But antispasmodics act less powerfully, and they do not in general produce that state of insensibility and diminished power which follows the application of narcotics. This might be supposed owing to a mere difference in strength; yet there seems also to be something farther than this, since antispasmodics produce no such effect in any dose, and since, although they are so much inferior to narcotics in this respect, they are sometimes equal in repressing inordinate and irregular muscular action. The difference has been explained on the supposition, that, as stimulants, they have less diffusibility and greater durability of action; or else, that, with their stimulant operation, they have no direct power of diminishing the powers of the system. Considered under either view, they form an intermediate class between narcotics, which are so highly diffusible, and tonics, which are much more permanent in their stimulant operation; and experience shews, that they partake of the properties of both. Several narcotics and tonics are frequently used as antispasmodics; and the powers of the principal antispasmodics, in obviating spasmodic affections, are apparently connected principally with their stimulant power.

From the name given to this class, their medicinal application may be understood. Spasm consists in irregular muscular contraction; sometimes the contraction is permanent; at other times it alternates with relaxation, but even then both are performed more quickly, and

the contractions are more powerful and permanent than natural. Many diseases depend on spasmodic action, and others are accompanied with affections of this kind. The medicines which obviate and remove such a state are termed Antispasmodics.

Spasm may originate from various causes. One of the most frequent is a strong irritation, continually applied, such as dentition, worms, or the presence of any foreign substance in wounds, the effect of this irritation being extended more or less to the nervous system, or to the voluntary muscles. Excessive irritability must give rise to similar effects. In such cases, narcotics must prove useful, by diminishing irritability and sensibility. Sometimes spasm appears to rise from mere debility, as is exemplified in the convulsive motions in an animal exhausted by hæmorrhage or other debilitating causes; and the obvious means of removing it, when it arises from this cause, is by the use of tonics. Both narcotics and tonics, therefore, are employed as antispasmodics; such, for example, as opium and ether belonging to the one, and zinc, mercury, and Peruvian bark to the other; and these are indeed the most powerful of antispasmodics. But there are farther several substances which cannot be with propriety referred to either of these divisions, as musk, castor, assafœtida, galbanum, valerian; they are in some measure intermediate: though their specific operation cannot be very well explained. It is to these that the name of Antispasmodics is more exclusively appropriated.

Few general observations can be made on this class of medicines. Hysteria, chorea, epilepsy, hydrophobia, cholera, singultus, palpitation of the heart, and asthma, are the principal diseases in which they are employed. As their effect is not very permanent, they require to be given during the paroxysm of the spasmodic disorder, or a short time before its approach. For the same reason, the dose requires to be frequently repeated. Those, however, which belong to the class of tonics require an opposite mode of administration, their beneficial effects being obtained only from their continued use.

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## ANTISPASMODICS.

| | |
|---|---|
| MOSCHUS. | BUBON GALBANUM. |
| CASTOREUM. | SAGAPENUM. |
| SUCCINI OLEUM ET ACIDUM. | VALERIANA OFFICINALIS. |
| BITUMEN PETROLEUM. | CROCUS SATIVUS. |
| AMMONIÆ SUBCARBONAS. | MELALEUCA CAJUPUTI. |
| FERULA ASSAFŒTIDA. | |

### NARCOTICS USED AS ANTISPASMODICS.

| | |
|---|---|
| ETHER. | OPIUM. |
| CAMPHOR. | PRUNUS LAURO-CERASUS. |

### TONICS USED AS ANTISPASMODICS.

| | |
|---|---|
| CUPRUM. | HYDRARGYRUS. |
| ZINCUM. | CINCHONA. |

Moschus. Musk. Moschus moschiferus. Musk Ox. *Cl. Mammalia. Ord. Pecora. Asia.*

The animal which afford musks is a native of the elevated regions of the east of Asia. The musk appears to be a peculiar secretion, which is deposited in a small sac situated near the umbilicus of the male. It is brought from China, or from India, in its natural receptacle, a small membranous bag, covered externally with coarse hair. The musk within is in grains, slightly unctuous, of a black colour, having a very strong durable smell, and a bitter taste.

Ammonia and a portion of volatile oil exist in it and communicate these properties.

Musk is an antispasmodic supposed to be of considerable power; it is administered occasionally in a number of spasmodic diseases, especially hysteria, epilepsy, and singultus, and also in diseases of debility. In typhus fever it is employed to relieve subsultus tendinum, and other symptoms of a spasmodic nature. In cholera it is given with the view of checking vomiting. In retrocedent gout it is employed as a stimulant. Combined with ammonia, it has been celebrated for its power of arresting the progress of gangrene. Its efficacy in some of these affections has undoubtedly been exaggerated; and from this, as well as from its high price, it is at present not very often employed. Its dose is from 6 to 20 grains, repeated, if necessary, every five or six hours. It is best given in the form of bolus. To children, it has been given under the form of enema, as a remedy in the convulsions arising sometimes from the irritation of dentition.*

*Offic. Prep.*—Mist. mosch. Tinct. mosch.

Castoreum. Castor. *Castor Fiber. Mammalia. Glires.*

The beaver, an amphibious quadruped, is a native of the north of Europe, Asia, and America. Castor is a peculiar product collected in membranous cells near the extremity of the rectum in this animal. The follicles inclosing it are cut off, and dried by exposure to the smoke of fuel. The castor, which is naturally soft and oily, becomes hard. It is imported of superior quality from Russia; an inferior kind is brought from New England. The former is dry slightly unctuous, of a reddish brown colour, intermixed with fibres and covered with a tough membrane; it has a strong unpleasant smell, and a bitter acrid taste. The American castor is more shrivelled, and inferior in taste and smell. The active matter of castor is dissolved by alcohol, proof spirit, and partially by water; it was discovered by M. Brandes, and has been named *Castorine.*

Castor is used as an antispasmodic, in hysteria principally, sometimes in amenorrhœa, in a dose from 10 to 20 grains, or from one to two drachms of the tincture; but it is doubtful if it has any power.

*Offic. Prep.*—Tinc. cast. Tinct. cast. comp.

Succinum. Oleum et Acidum Succini.

The bituminous substance, amber, though it has a place in the

* *Incompatible Substances.* Perchloride of mercury, nitrate of silver, sulphate of iron, and infusion of yellow cinchona.—B.

list of the Materia Medica of the different Pharmacopœias, is perfectly inert, and is introduced only as affording, by distillation, an empyreumatic oil, which has been applied to some medicinal uses. This oil is at first thick and of a dark brown colour; but by repeated distillations with water it becomes limpid, still retaining, however, a very fetid odour. It has been celebrated for its antispasmodic power, and has been employed in hysteria and amenorrhœa in a dose of from 10 to 15 drops. It is now discarded from practice, or is used only as an external stimulating application in paralysis, chronic rheumatism and hooping cough.

Along with this oil, a concrete acid is produced in the distillation, which is at first impure, but is purified by sublimation, or by solution and crystallization. It has a place in the Edinburgh and Dublin Pharmacopœias, but is destitute of any medicinal power, and is never applied to any use.

Bitumen petroleum. Petroleum Barbadense. Mineral Tar.

Various kinds of liquid bitumens exist as natural productions, of different degrees of thickness, of a colour more or less deep, and more or less volatile. That which has been usually kept in the shops, under the name of Barbadoes Tar, is thick, of a dark brown colour, having a smell that is fetid, and a warm bitter taste. It has an analogy to the preceding empyreumatic oils in its properties: and like them has been used as an antispasmodic and expectorant in asthma and chronic catarrh, and externally as a stimulating application in rheumatism and paralysis. Though it retains its place in Pharmacopœias, it is scarcely ever used.

Sub-carbonas ammoniæ. Sub-carbonate of Ammonia. Sal Cornu Cervi. Salt of Hartshorn.

This salt used to be prepared by exposing horns of the deer to heat, which causing the elements of the animal matter to enter into new combinations, a large quantity of sub-carbonate of ammonia was evolved. It was impregnated with a fetid empyreumatic oil, which was supposed to increase its power as an antispasmodic. The pure salt is sometimes given as an antispasmodic in a dose of 5 or 10 grains: it is more frequently used as a stimulant applied to the nostrils in fainting.

Ferula assafœtida. Assafœtida. *Pentand. Digyn. Umbellatæ*, Linn. *Umbelliferæ*, Juss. *Gummi-Resina. Persia.*

Assafœtida is a concrete gum-resin, obtained by exudation from incisions made in the roots of the plant, the juice, after it exudes, being inspissated by exposure to the sun. It is in small masses, of a variegated texture, yellow on the external surface, white within, having an extremely fetid smell, and a taste bitter and sub-acrid. It consists principally of resin and gum, and of an essential oil, which adheres to the resin, and communicates the taste and odour.

Assafœtida is used as an antispasmodic in different nervous diseases, especially in amenorrhœa, hysteria, dyspnœa, dyspepsia attended with flatulence, and tympanitis, and is superior in efficacy to

any of the fetid gums. Its dose is from 5 to 20 grains, in the form of pill, or diffused in water: it usually proves slightly laxative, and to obtain any advantage from it requires its continual use. It is likewise given, under the form of enema, in tympanitis, flatulent colic, in the violent hysteric paroxysm, and as a remedy against worms, 2 drachms being diffused in 8 ounces of warm milk or water; it is sometimes, too, applied as a plaster.

*Offic. Prep.*—Mist. assafœt. Tinct. assafœt. Pil. assafœt. Emp. assaf. Enem. fœtid.

Bubon galbanum. Galbanum. *Pentand. Digyn. Umbellatæ*, Linn. *Umbelliferæ*, Juss. *Gummi-Resina.*

The plant which affords this resinous substance is a native of Syria, and also of the Cape of Good Hope. The Galbanum is obtained in the form of a milky juice, by exudation from incisions in the stem of the plant; when hardened it is in the form of a mass somewhat variegated in its texture, tenacious, of a yellowish brown colour, having a smell somewhat fetid, and a bitter acrid taste.

Alcohol dissolves its resin, in which its powers have been supposed to reside; proof-spirit dissolves it entirely, the impurities excepted. Triturated with water, it is diffused, and forms a milky-like fluid; it consists of resin, gum and volatile oil.

Galbanum has the virtues of the fetid gums, and is used for the same purposes, and sometimes combined with them, in hysteria and amenorrhœa; being inferior in strength, however, to assafœtida, it is less employed. It is slightly laxative, and is sometimes used as an aperient; it is employed too as an expectorant, with myrrh and ammoniac, to check effusion from the mucous glands of the lungs. Its dose is 10 grains. Externally, it is more frequently used as a discutient to indolent tumours, and as a stimulant to promote suppuration.

*Offic. Prep.*—Empl. galb. Pil. galb. Tinct. galb.

Sagapenum. *Gummi-Resina.*

This gum-resin, usually imported from Alexandria, is the produce of an unknown tree, said to be a native of Persia. It is in small masses, of a yellow colour, having a smell slightly fetid, and a nauseous taste; it is soluble in proof-spirit; by distillation it affords a small quantity of essential oil. Its virtues and uses are the same as those of the assafœtida, to which, however, it is inferior in power. It is only employed in combination with more active gum-resins, and might be dispensed with.

*Offic. Prep.*—Pil. galbani. Confect. rutæ.

Valeriana officinalis. Wild Valerian. *Triand. Monogyn. Aggregatæ*, Linn. *Valerianæ*, Juss. *Radix. Indigenous.*

The root of this plant, which is the part of it used in medicine, consists of slender fibres twisted and attached to one head, of a light brown colour, having a smell strong and unpleasant, and a warm bitter taste, the smell and taste being stronger in wild valerian than in that which is cultivated. Its active qualities reside in a volatile

oil, which is dissolved by water, alcohol, and solutions of the alkalis; it is of a greenish white colour, and is converted into resin and oxalic acid by nitric acid, and is said to contain a portion of camphor.

Valerian is an antispasmodic, not unfrequently employed in modern practice, especially in hysteria, chorea, and epilepsy, where these depend not on organic derangement, or on any permanent irritation, but on increased susceptibility of the nervous system. Sometimes, also, it is used with advantage in hemicrania. Its dose is from one scruple to one drachm three or four times a-day, which is increased gradually as far as the stomach can bear it. Sometimes it is taken under the form of infusion, or of tincture.

*Offic. Prep.*—Infus. valer. Tinct. valer. Tinct. valer. ammon.*

Crocus sativus. Saffron. *Triand. Monogyn. Liliaceæ*, Linn. *Irideæ*, Juss. *Floris Stigmata.*

This plant is cultivated in the south of England to afford the Saffron of the shops. The stigmata which crown the pistil of the flower are separated from the other parts, are submitted to pressure with a moderate heat, and thus form a soft mass of intermixed fibres, named Cake Saffron; when dried separately, they form Flower Saffron. The former is what is usually kept. It is in tough cakes somewhat moist, of a deep reddish yellow colour; its flavour is aromatic and diffusive, its taste warm and bitterish. An extract may be obtained from it which has been named Polychroite; it is of a deep yellow colour; sulphuric acid changes it to a bright blue, and nitric acid to grass green; it is soluble in water and in alcohol; it forms half the weight of saffron.

Saffron was formerly regarded as a very active medicine, possessed of high stimulant and antispasmodic power, and requiring, it was imagined, to be given with much caution. Experience has proved it to be nearly inert, and it is now used only to give colour to other remedies.

*Offic. Prep.*—Tinct. croci. Syr. croci.

Melaleuca cajuputi. *Polyadelph. Polyand. Hesperidæ*, Linn. *Myrtaceæ*, Juss. *Oleum Volatile. Cajeput Oil. India.*

The essential oil, known by the name of Cajeput Oil, is procured from the Melaleuca leucadendron or cajuputi, a tree which grows in Borneo and at Amboyna. The oil is obtained by distillation from the leaves and fruit: it has a green or yellowish colour, a strong fragrant odour, somewhat similar to that of camphor, and an extremely pungent taste. It is highly volatile and inflammable. It is entirely soluble in alcohol when not adulterated with oil of turpentine.

This oil has been used as a diffusible stimulant and antispasmodic, in tympanitis, flatulent cholic, hysteria, palsy, chronic rheumatism, and various other diseases of debility. Its dose is 3 or 4 drops on a lump of sugar. It is also applied externally to relieve rheumatic and

* *Incompatible Substances.* The salts of iron.—B.

gouty pains, and sometimes gives sudden temporary relief; it often succeeds in relieving the pain of toothach, when applied to the affected tooth.

Several substances are employed as antispasmodics, and which I have therefore placed in the table, which more strictly belong, however, to some of the other classes. Under these, therefore, their history is given, including the notice of those few applications of them as remedies, connected with their antispasmodic power.*

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# CHAP. IV.

## OF TONICS.

By Tonics are understood those substances, the primary operation of which is to give strength to the system. It has been conceived, that muscular vigour depends on a certain degree of tension, or tone, as it is named, of the muscular fibre; and those substances which renew that vigour when impaired have been considered as restoring this due degree of tension, and have thus received the appellation of Tonics. They are not, however, to be considered as operating by any change they produce in the state of the solids, as this opinion implies. They act upon the living principle, and so far as their action is understood, are stimulants of considerable power, permanent in their operation.

The distinction has been already pointed out between stimulants, which is founded not so much on a difference in their power, as in the quickness with which their full effect is produced, and in the transient nature of that effect. If a medicine suddenly raises a high state of excitement, this is usually as quickly followed by proportional languor or debility, and the changes from both modes of action, in the state of the functions of the body, are well marked. But if the stimulant operation be more slowly exerted, any change is much less conspicuous, and the succeeding collapse takes place to no considerable extent; when the administration of the remedy is continued, it is prevented by the renewed excitement; and when it is suspended, the effect is merely a gradual abatement of excitement, which is rendered less evident from being counteracted by the action of the stimulants habitually applied. On these principles the action of tonics

* Although not mentioned by Dr. Murray, *Emetics* may be considered among the most powerful antispasmodics at present in our possession. In many cases of spasmodic disease they possess an evident and decided advantage over most of the remedies ordinarily resorted to, in the facility with which they may be administered and the promptness with which they operate. In hysteria, epilepsy, and convulsions more especially, their efficacy has been confirmed by repeated trials, and there is just reason for believing that their use might be advantageously extended to a still larger number of diseases of a similar character. For some interesting views on this subject, I refer to a paper of Dr. Joseph M. Smith of this city, published in the transactions of the Physico-Medical Society of New-York.—B.

is explained. It is only by their stimulant operation that they can obviate debility; as their effect is gradual, their action is not followed by that exhaustion and diminished susceptibility which invariably follows from excitement suddenly raised: and the state of increased action which they excite and sustain is favourable to the acquisition of power. If their administration, however, be carried to excess, or be continued too long, it may at length diminish the powers of the system; and if employed in a state of health or high vigour, their effects may be injurious.

Tonics act primarily on the stomach, the action they excite in that organ being conveyed generally by nervous communication to the rest of the system. This is evident from their effects often taking place in a short time; and there are experiments which prove, that when some tonics, as Peruvian bark, have been taken for a considerable length of time, no portion of them can be discovered by any chemical test in the blood. There are some of them, however, especially the metallic tonics, which seem to be received into the circulation.

The stimulating effect of tonics is principally to be observed from their continued administration; they increase gradually the force of the circulation, promote the action of the digestive organs, augment the secretions, or moderate them when they have been morbidly increased, and give vigour to the muscular system. From the action of some of the more powerful remedies of this class, these effects are apparent, even in a short time. The diseases in which they are employed must be obviously those of diminished power.

Tonics may be subdivided into those derived from the mineral, and those from the vegetable kingdoms: the former division comprehends several of the metals, and one or two of the earths. Under the vegetable tonics are comprised a number of substances possessing bitterness, and an aromatic pungency. These two qualities are generally blended in the most powerful tonics belonging to the vegetable kingdom: and there is a transition from these to the more pure bitters and aromatics. The stimulating action of the latter is rather too local and transient to give rise to much permanent tonic effect: yet they can scarcely be placed under any other class, and I have therefore associated them with the substances with which they are thus connected. The purest Bitters are powerful Tonics, as is proved by their efficacy in curing intermittent fever, as well as by the advantage derived from them in a debilitated state of the digestive function. Aromatics may also be considered as tonic in their action on the stomach, if not on the general system, and are often employed to obviate debility in that organ, and to promote the powers of digestion.

# TONICS.

FROM THE MINERAL KINGDOM.

| | |
|---|---|
| Argentum. | Bismuthum. |
| Hydrargyrum. | Barytes. |
| Ferrum. | Calx. |
| Zincum. | Acidum nitricum. |
| Cuprum. | Acidum nitro-muriaticum. |
| Arsenicum. | [Aurum.—b.] |

FROM THE VEGETABLE KINGDOM.

| | |
|---|---|
| Cinchona officinalis. | Gentiana lutea. |
| Aristolochia serpentaria. | Anthemis nobilis. |
| Dorstenia contrayerva. | Citrus aurantium. |
| Croton eleutheria. | Citrus medica. |
| Bonplandia trifoliata. | Acorus calamus. |
| Swietenia febrifuga. | Laurus cinnamomum. |
| Swietenia mahagoni. | Laurus cassia. |
| Salix alba. | Canella alba. |
| Colomba. | Wintera aromatica. |
| Quassia simarouba. | Myristica moschata. |
| Quassia excelsa. | Caryophyllus aromaticus. |

FROM THE VEGETABLE KINGDOM.

| | |
|---|---|
| Capsicum annuum. | Coriandrum sativum. |
| Piper nigrum. | Pimpinella anisum. |
| Piper longum. | Mentha piperita. |
| Piper cubeba. | [Eupatorium perfoliatum.—b.] |
| Myrtus pimenta. | [Cornus florida.—b.] |
| Amomum zingiber. | [Prunus virginiana.—b.] |
| Amomum repens. | [Liriodendron tulipifera.--b.] |
| Carum carui. | |

TONICS FROM THE MINERAL KINGDOM.

These are in general more local in their action than the vegetable tonics; they either operate more directly on the stomach, without their action being so quickly extended to the whole system, or they act by being received into the blood. Hence they produce less immediate general excitement, and it is only from their continued administration that their tonic effect is obtained.

Argentum. Silver.

This metal is distinguished by its pure white colour, its high degree of lustre, and its great ductility and malleability. It is not very susceptible of oxidation; it does not suffer that change from exposure, even in a state of fusion, to atmospheric air. Those acids which yield oxygen readily oxidate and dissolve it, particularly nitric acid, which is hence employed as its usual solvent. The solution, when evaporated, affords the nitrate of silver in a crystalline form.

It appears that nitrate of silver was sometimes employed by the older physicians, but the harshness and violence of its operation led to its disuse. More lately it has been introduced as a remedy in epilepsy,—a disease which, when not depending on organic derangement, is frequently connected with morbid susceptibility, and which tonics sometimes remove. The advantage derived from the administration of nitrate of silver has been established on the testimony of Dr. Sims, Dr. Cappe, Dr. Bostock, and others. The dose, when the medicine was first introduced, did not exceed one or two grains in the day; it has, however, been considerably increased, some patients taking as much as eighteen grains in the course of twenty-four hours. The dose should be increased gradually. It is remarked by Dr. Powel, that the medicine agrees better with the patient in the form of pills, than when given in a solution. Thus, in some instances, he gave 15 grains in the form of a pill, when the stomach could not bear more than five grains in the form of a solution. The pills should be made with bread, and Dr. Barker recommends that they be covered with silver leaf, to prevent their injuring the throat. To produce any effect on the system, it is necessary to continue the exhibition of the remedy for several months; its efficacy is most certain when it acts moderately on the bowels, but if it purges much it should be intermitted. It has also been given in chorea and angina pectoris. Sometimes, when beneficial effects appear to have been produced by it in these spasmodic diseases, they return as severely as before, and when this happens, it is found of no farther efficacy.

A singular and disagreeable effect attends the internal use of nitrate of silver, that the skin, especially of those parts exposed to light, is darkened in colour to a considerable degree, so as to become of a livid or leaden hue. This discoloration arises probably from some action of the medicine upon the *rete mucosum*.* It cannot be removed by any treatment when it has taken place, except, it is said, by the continued use of cream of tartar. Fused nitrate of silver is used as an escharotic, under the name of lunar caustic.† [For additional

* So many cases have now been recorded, and on such high authority, that the skin does actually undergo a peculiar discoloration from the continued use of nitrate of silver, that we should have supposed no one would have questioned the fact. Dr. Chapman, of Philadelphia, however, has made the wonderful discovery that all this is a mistake, and affirms that this dark hue produced in the skin is not the effect of the remedy, but is one of the symptoms of the disease (epilepsy) for which the remedy was used !‡ In reply to this statement, we have only to propose the following queries: Has this peculiar symptom ever been noticed in epilepsy by any author, ancient or modern, before the use of nitrate of silver was introduced as a remedy? How is it that this discoloration, if it be merely a symptom of epilepsy, remains permanent for life, and that, too, after the disease has been completely cured? And finally, How is it that this same discoloration has occurred in other diseases where the nitrate of silver has been used? Dr. Paris states that he witnessed this effect in a lady who had taken large doses of the nitrate for the purpose of curing a dyspeptic complaint.§ Doubtless this leaden discoloration will soon be discovered to be a symptom of dyspepsia too.—B.

† *Incompatible Substances.* Fixed alkalies, the hydro-chloric, sulphuric and tartaric acid, soaps, arsenic, hydro-sulphurets, vegetable astringent infusions, and undistilled waters.—B.

‡ Mat. Med. Vol. 1. p. 53. Ed. 1831.

§ Pharmacologia, 4th Am. from the 7th. Lond. Ed. p. 294.

information concerning silver, see Part II. of this work, under the head "Metallic Preparations."]

**Hydrargyrum. Hydrargyrus. Argentum vivum. Mercurius.** Mercury or Quicksilver.

It has not been usual, in arrangements of the articles of the Materia Medica, from their medicinal power, to place mercury under the class of tonics, but rather under that of sialagogues. Its power, however, of exciting the salivary discharge is merely a secondary effect, not constant nor uniform, and which is not essential to its efficacy in any disease. On the contrary, its tonic power is its primary operation; it is the most general stimulant belonging to the Materica Medica, pervading every part of the system; acting, as Dr. Cullen has remarked, as a stimulus to every sensible and moving fibre of the body, and producing the most permanent effects. Hence it is the most general evacuant we possess; and, from its stimulant operation, exerted directly or indirectly, is derived its utility in many diseases.

This metal is peculiarly distinguished by its fluidity at common temperatures. It does not become solid till cooled to 40° of Fahrenheit. In its liquid state it has the perfect opacity and lustre characteristic of metals, and likewise the property of great density, its specific gravity being to that of water as 13.5 to 1 nearly; it boils at a temperature a little above 600°, and, when boiling, suffers oxidati n from the action of the atmospheric air. It is oxidated even at natural temperatures, when subjected to agitation; or, still more easily, when triturated with any viscid matter, which is interposed between its globules, so as to extend their surface. Its chemical equivalent is 200.

Quicksilver occurs in nature combined with sulphur, and is obtained from this ore, submitted to heat mixed with iron or lime, either of which combines with the sulphur, and the mercury is separated by distillation. The quicksilver of commerce is sometimes impure, or adulterated by the intermixture of other metals, particularly lead and bismuth. This may be suspected when the metal loses its lustre speedily, and is covered by a grey film, or from its diminished mobility, in consequence of which its globules do not preserve exactly the spherical form, nor unite easily with each other; and it may be discovered with certainty, by exposing it to a heat sufficient to volatilize the quicksilver, when any other metal present will remain. It is best purified by distillation from iron-filings in an iron retort.

Mercury is not, in its metallic state, applied to any medicinal use; but, under various forms of preparation, in most of which it is either simply oxidated, or its oxides are combined with acids, it is extensively employed, and affords a series of active remedies.

When rendered active on the system by any of the modes of preparation to which it is subjected, it operates as a powerful and general stimulant. When given in moderate quantity, it communicates general vigour: it increases the force of the circulation when this has been languid; by the increased vascular action which it excites it

gives to the blood the disposition to assume the buffy coat; and by its stimulant operations on secreting organs it promotes the secretions, and hence acts as a very general evacuant. It peculiarly stimulates the salivary glands, and under all its forms of preparation speedily excites the salivary discharge, an effect scarcely produced by any other substance not locally applied, and probably owing, as will be explained under its history, as a sialagogue, to its affinity to the saline matter existing in that secretion. It increases also the cuticular discharge, and it appears to promote the secretion of bile, and probably of the other intestinal fluids. Its stimulant operation on the absorbent system is not less evident; hence the emaciation which is the consequence of its continued action. From these diversified effects which Mercury produces, it is capable of being applied to the treatment of numerous states of disease.

In the febrile affections of warm climates, yellow fever and bilious remitting fever, it is a remedy of the highest value. It is probably useful principally as an evacuant; these forms of fever being peculiarly connected with a disordered state of the intestinal canal and abdominal secreting organs, and mercury always promoting the evacuation of the intestinal fluids; it is accordingly under the form of calomel, the mercurial which acts most powerfully on the liver and intestines, that it is chiefly employed. Some benefit may also be derived from its general stimulant action, as it proves most successful when given to that extent as to affect the system. Advantage is derived from it, probably from a similar mode of operation, in dysentery, especially when it is given in combination with opium. In the fevers of cold climates it is less employed.

There are some forms of inflammatory action in which mercury is useful. In that chronic inflammation particularly which affects glandular organs, it is the principal remedy both in counteracting it, and in removing that state of morbid structure which is often its consequence. Hence the peculiar advantage derived from mercurials in chronic hepatitis, and induration of the liver, in glandular obstruction and schirrosity, and in indolent tumours. Calomel is the preparation which in these cases appears to be most effectual, though the introduction of mercury by friction is also employed, perhaps with equal success. Considerable advantage is also derived from it in rheumatism.

In various diseases dependent on spasmodic action, mercury affords the most powerful remedy. In tetanus particularly, if the mercurial action on the system can be fully established, the violent spasm is sometimes resolved, and calomel given to a large extent, aided by mercurial inunction, affords the remedy which has been most frequently attended with success. In the milder affection of trismus, it is employed with the same views; and cases of hydrophobia have occurred, in which the disease appears to have yielded to a similar mode of treatment. It is also a valuable remedy in croup. In all these cases calomel is the preparation usually employed.

The stimulant operation of mercury on the absorbent system renders it useful in the different forms of dropsy. It is given to the ex-

tent of exciting salivation in hydrocephalus; in ascites it is more usually employed to promote the action of diuretics, and in that species of dropsy when it depends on induration of the liver; and also in dropsy of the ovarium, it proves still more useful by its deobstruent power. Its stimulant operation on the uterine system leads to its employment as an emmenagogue, and its determination to the intestines promotes the operation of purging.

Cutaneous diseases, lepra, tinea capitis, scabies, and others, are occasionally removed by the internal administration of mercury as an alterative; and these, as well as various forms of cutaneous eruption and ulceration, often yield to the external application of mercurial preparations.

The most important medicinal operation of mercury remains to be stated,—that displayed in removing the disease induced by the syphilitic poison. In this its power is nearly, if not altogether specific; no article of the Materia Medica could be substituted for it; and there may be affirmed of it, what cannot with equal justice be said of any remedy employed in the treatment of any other morbid affection, that, if duly administered, it will scarcely ever fail in effecting a cure. It is difficult to assign any satisfactory theory of its operation. Its efficacy has been ascribed to its general evacuant power, in consequence of which the syphilitic virus is discharged from the body. But the speedy disappearance of the local symptoms of syphilis under its use, and even from its local application, affords a proof that it operates on some other principle; no similar advantage is derived from other evacuants; and its efficacy is not proportional to the evacuation it excites, but is frequently displayed where this is insensible. The opinion has been advanced, that it acts as an antidote to the venereal virus, neutralizing it somewhat in the manner in which one chemical agent subdues the properties of another,—an opinion vague and hypothetical, and rendered improbable from the consideration of the small quantity of some of the more active preparations of mercury, from which a cure may be obtained, compared with the large quantity of others less active that requires to be administered. The explanation advanced by Mr. Hunter, that the efficacy of mercury in the treatment of syphilis depends on its general and permanent stimulant operation on the system, by which it induces and keeps up an action incompatible with that morbid action which constitutes the disease, until the virus is destroyed by the chemical changes going on in the system, or until it is eliminated from the body by the usual excretions, is on the whole most probable; it rests on a principle undoubted, that there are states of morbid action incompatible, so that one suspends the action of the other: mercury does exert a very general action, inducing and keeping up what may be regarded as a morbid state; and if this is incompatible with the action which constitutes syphilis, the continuance of it for some time will suspend the latter; and the venereal virus will, in common with any other matter contained in the circulating mass, be changed or discharged.

Of late, however, some opinions have been brought forward, which, without denying the efficacy of mercury in the treatment of syphilis,

place the subject in a different light. The disease, in all its forms, it is affirmed, can be cured without the use of mercury, and by remedies of the simplest kind :—common dressings applied to sores, rest in the horizontal position, the common antiphlogistic regimen, and occasionally the use of the decoction of sarsaparilla. Under such treatment, the primary symptoms of syphilis, it is affirmed, disappear, though, it is admitted, more slowly than with the administration of mercury; and secondary symptoms do not supervene, it is asserted, more frequently than they do even after a common mercurial course, while the injurious effects of mercury on the constitution are avoided. There seems to be much truth in these statements. Syphilis appears to have become a milder disease than it was when it first appeared in Europe ; and may, when the circumstances are favourable, be cured without the aid of mercury. But this is no reason for abandoning the use of a powerful remedy, which cures the disease with certainty, and if properly administered, with perfect safety, to the general health. It is to be remarked, there sometimes are met with morbid affections similar in their symptoms to lues venerea, and yet not arising from the syphilitic virus. These are more easily treated ; and probably not a few of the cases which have been successfully managed without mercury were of this description.

The mode of administering mercury for the cure of the venereal disease, under all its forms, is now ascertained with sufficient precision. There is no advantage in giving it so as to induce profuse salivation ; this is even to be avoided as hurtful ; but it is proper that salivation should be excited to a certain extent, not as essential to its efficacy, but as a proof of its action on the system being obtained. This is kept up for a certain time, longer or shorter, according to the state of the symptoms, and the previous continuance of the disease. Exposure to cold is avoided, as being liable to cause the more partial operation of mercury on the salivary glands : and the state of irritation is diminished, or determination to the intestines producing purging is obviated, by the exhibition of an opiate. When profuse salivation occurs, the remedies employed to check it are cathartics in moderate doses, cinchona, small doses of opium, the application of a blister to the throat, and the administration of sulphuret of potash; the last being employed from the doubtful hypothesis, that its chemical agency may neutralize the mercury. Free exposure to a cool dry air is, according to the observations of Mr. Pearson, more effectual than any other method. When the morbid irritation, from the action of mercury, rises too high, producing a state of exhaustion, which sometimes proceeds rapidly to an alarming extent, the administration of the remedy must be immediately suspended ; and in this case also, exposure to a cool atmosphere is advantageous.

The preparations of Mercury, medicinally employed, are its oxides, chlorides, sulphurets and salts. The particular processes for obtaining them are inserted and explained in the pharmaceutical part of the work. Here it is sufficient to notice briefly their distinctions and applications.

The Protoxide, to which the names of Grey oxide and Black oxide are also given, formed by the trituration of mercury, is the basis of

a number of preparations. In these, the metal has been supposed indeed to be merely mechanically divided; but in its metallic state, mercury does not appear to exert any action on the living system, and the activity of it in these preparations is a proof that it is oxidated. This is established more directly; quicksilver, by agitation, is converted into a black powder; and this, like other oxides, is soluble in muriatic acid, which metallic mercury is not.

This oxidation is much promoted by the quicksilver being triturated with any viscous substance which facilitates the division of its globules. By trituration with mucilage of gum-arabic, a preparation is obtained, named Plenk's Mercurial Solution, the operation of which is extremely mild. Rubbed with chalk, it forms the Hydrargyrum cum Creta of the London and Dublin Pharmacopœias, and with Magnesia the Hydrargyrum cum Magnesia of the Dublin Pharmacopœia, preparations having nothing to recommend them. The Mercurial Pill, prepared by triturating quicksilver with conserve of rose, and adding a sufficient quantity of starch to form a pill mass, is, of all the preparations adapted to affect the general system, the one most commonly employed, and is perhaps equal to any other, having the advantage of not being liable to produce much irritation, while we can depend on the certainty and permanence of its action. In a dose of eight grains, morning and evening, it soon affects the general system; in a larger dose, it is liable to occasion purging. Quicksilver, triturated with lard, soon loses its metallic form; and the ointment, after it has been kept for some time, contains little of it in the metallic state, the unctuous matter probably promoting its oxidation. The oxide is diffused through the lard, and when the ointment is rubbed on the skin is forced through the cuticle, and is taken up by the absorbents; the system is thus affected, without the unpleasant consequences of nausea and purging, sometimes occasioned by the internal administration of even the mildest mercurial preparation; this method is employed therefore, where, from the state of the system, these affections are liable to be produced. Where it is necessary, too, to give the remedy in a large dose, or to bring the system speedily under its action, mercurial friction is employed, along with the administration of some of the mercurial preparations by the mouth. In certain local affections, particularly bubo, some advantage is derived from the mercury being conveyed through the affected gland.

The Mercurial Plaster is the metal triturated with melted resin and oil, and mixed with litharge plaster: It is sometimes applied to indolent glandular tumours as a discutient.

Mercury oxidated by exposure to atmospheric air, at a high temperature, gives an oxide in scales of a red colour, consisting of one equivalent of mercury and two of oxygen. This, the red oxide, or peroxide, (Oxidum Hydrargyri Rubrum,) is too energetic to be given internally, but forms a useful stimulating ointment. The nitrate of mercury decomposed by heat furnishes what is named Oxidum Hydrargyri Rubrum per Acidum nitricum, by the Edinburgh College, and Hydrargyri Nitrico-Oxydum by the London. It contains a small

portion of nitric acid, which increases its caustic power; hence it is used only as an escharotic.

Mercury combined with chlorine, in two different proportions, forms two active preparations, which have long been known under the names of Corrosive Sublimate and Calomel.

The first of these compounds, Corrosive Sublimate, was supposed, on the old doctrine of the constitution of muriatic acid, to consist of the metal highly oxidated, and this combined with a large proportion of muriatic acid. And on this view were given to it the names of Corrosive Muriate of Mercury and Oxymuriate of Mercury. But it is now regarded by chemists as a compound of metallic mercury and chlorine, in the proportions of one equivalent of the former, 200, and two of the latter, 72,=272. Its proper name, therefore, is Bichloride of mercury, but it is usually termed Corrosive Sublimate.

This substance is obtained by sublimation in the form of a solid white mass, or, if more slowly sublimed, in crystalline needles. It is soluble in water, when, even on the new view, it becomes a permuriate of mercury, the water yielding oxygen to the metal to form oxide of mercury, and hydrogen to the chlorine to form muriatic acid. It has a taste styptic and metallic, and exerts a degree of escharotic power. It is the most active of all the preparations of this metal; even in a small dose it occasions severe griping and purging; a larger quantity causes inflammation of the intestines, tenesmus, and discharge of blood, profuse salivation, and convulsions which terminate in death. As a poison, it affects both the heart and nervous system, the affection of the latter being marked by the convulsions and the state of insensibility which it induces; of the former, by the rapid cessation of the circulation. It appears at the same time to act chemically on the stomach, the mucous membrane of that organ, in an animal killed by it, being found on dissection soft and pulpy, so as to be easily detached. The remedies to counteract it are easily procured and effectual, white of egg or wheat flour; either of these given diffused in water is a perfect antidote, the albumen of the former, and the gluten of the latter decomposing the corrosive sublimate, so as to convert it into calomel, with which they remain combined in the state of an inert mass, which may be removed by vomiting. Alkaline solutions are also antidotes.

The detection of corrosive sublimate, in cases where death has been caused by it, may be effected without ambiguity, by the methods pointed out by Dr. Christison in his able work on Poisons. If a solid substance, suspected to be corrosive sublimate, is procured from the stomach, it should be heated in a glass tube, when, if it be that compound, it will form a white crystalline sublimate. Or it may be treated with solution of caustic potash, which will separate the peroxide of mercury of a bright yellow colour; this colour distinguishes the corrosive sublimate from calomel, which, treated in the same manner, yields the black protoxide. If a fluid be obtained from the stomach, suspected to contain corrrosive sublimate, protochloride of tin is to be added to it, which, if mercury be present, will throw down a dark grey precipitate. This is allowed to subside in a glass tube, the fluid poured off, and water several times add-

ed and poured off. Heat is then applied to the tube, and when the moisture is dissipated fluid mercury will remain. In this process the protochloride of tin abstracts the whole of the chlorine from the corrosive sublimate, and passes off in solution, leaving metallic mercury. If the fluid obtained from the stomach contain a large intermixture of animal and vegetable matter, it may be agitated for a few minutes with ether, which abstracts the corrosive sublimate, and holds it dissolved, and to this ethereal solution the protochloride of tin is to be added. A delicate test of corrosive sublimate is also to drop a little of the suspected solution on a polished plate of gold, and then to touch the gold through the solution with the point of an iron wire; a galvanic action is excited, the mercury is precipitated, and renders the gold white. A solution of nitrate of silver may produce a similar white appearance; but this is merely a precipitate on the gold, and is easily wiped off, whereas the other is a real combination or amalgamation.

Corrosive sublimate was recommended by Boerhaave and Van Swieten as a valuable remedy in syphilis, having the advantage of speedily affecting the system and arresting the progress of the disease, being at the same time not so liable as other mercurials to induce salivation. The commendation of this remedy has not been verified by experience.

Its effects are liable to be violent, and, what forms the most important objection to it, its operation does not appear to be sufficiently permanent; hence, when the symptoms of syphilis have disappeared under its use, they are liable, it has been alleged, to return when it is suspended, or the disease recurs in some of its secondary forms. From these circumstances it is now little employed in the treatment of syphilis. Some of the empirical medicines which are boasted of as antisyphilitic remedies, and as containing no mercury, owe their efficacy to it; its activity rendering the dose so small, that it is more easily disguised by substances with which it is mixed, and its action being less liable than that of others, when the dose is small, to excite salivation. It is employed in other diseases in regular practice, particularly as an alterative in lepra and other obstinate cutaneous affections, and in rheumatism. A very dilute solution of it is used as a gargle in venereal sore throat, and as a lotion in some cutaneous affections. The system has sometimes been observed to be affected from its free external application, especially in a concentrated state, under the form of ointment or plaster; and some cases are related by Plenk, of death having been the consequence of such applications. When introduced into a wound, it occasions death, producing, at the same time, total disorganization of the part.*

Calomel, or as it is also named, Mild Muriate or Submuriate of Mercury, is the protochloride of the metal. It is not at all acrid like

* *Incompatible Substances.* Alkalies, alkaline earths, tartarized antimony, nitrate of silver, acetate of lead, sulphur, sulphuret of potash, and soaps; iron, lead, copper, bismuth and zinc in their metallic state; the volatile oils, and the following vegetable infusions, viz. infusions and decoctions of chamomile, horse radish root, columbo root, catechu, cinchona, rhubarb, senna, simarouba, oak bark, tea, and almond emulsion.—B.

the bichloride, is tasteless, and insoluble in water. It is one of the mildest of the mercurials, and one of the most certain in its operation on the general system. It is not so much employed as a remedy in syphilis, principally from its being liable to induce purging: but when this is obviated by the addition of small doses of opium, it is given in the dose of one or two grains morning and evening, and soon affects the general system. It is the mercurial, however, which is chiefly employed in the treatment of the other diseases in which mercury is prescribed. To the treatment of some of them it is peculiarly adapted by its action on the intestinal canal, and the secreting organs connected with it; hence its employment in febrile affections, in hepatitis and chronic induration of the liver, in schirrous affections of other visceral organs, in dysentery, and as a remedy in worms. It has also been very much employed of late in the yellow fever by Dr. Chisholm, Burnett and Boyd, and other highly respected practitioners, given in doses of from five to twenty or thirty grains every third or fourth hour; and the first of these writers observes: "Let it never be forgotten, that at whatever period of the disease salivation be excited, whether the supposed signs of putrefaction have appeared or not, the accession of it is the certain signal of cessation of disease, and of returning health." The mildness of its operation rendering it safe to administer it in large doses, so as speedily to bring the system under the action of mercury, renders it equally proper for administration in tetanus, hydrophobia, croup, laryngitis, and other diseases in which this is required. The same mildness adapts it to continued use; hence the preference given to it in cutaneous affections, in glandular obstructions, in dropsy, and wherever mercury is employed as an alterative. It not only produces the general effects of a mercurial, but also, when given in sufficient doses, acts with certainty and safety as a cathartic. It is hence often employed to promote the operation of other cathartics, and it has the peculiar advantage, that it does so without adding to the irritation which they are liable to occasion. Hence this combination is peculiarly useful where it is difficult to cause purging, or where, from the state of the stomach, the usual cathartics are liable to be rejected, especially when they are given in large doses.*

Dr. T. J. Aitkin has shewn, (Inaugur. Dissertat. that calomel is an effectual remedy in the cure of the severe constitutional symptoms which often follow puncture received at the dissecting table. He prescribes it in doses of five grains, taken every two hours, in mixture with ten grains of kino, which prevent its passing off by the bowels; the administration of it is suspended whenever it begins to affect the system, as indicated by the symptoms yielding, and the secretions being increased. He has found this treatment effectual in the most severe cases, and salivation was never induced to any considerable degree.†

* *Incompatible Substances.* Alkalies, lime-water soaps, sulphurets of potash and antimony, iron, lead, and copper. B.

† I have witnessed a case treated by Dr. Aitkin in the manner which I have mentioned in the text, and though the symptoms were such as seemed likely, if not relieved, to prove fatal, when the mercury began to act on the system, (which

Several of the salts of mercury are useful remedies. The Acetate of Mercury, as the basis of Keyser's Pill, was supposed at one time to be a certain and mild cure for syphilis. It is now known to be uncertain in its operation, and has fallen into disuse. The nitrate of mercury is highly caustic, and mixed with lard forms an ointment which is much employed. The subsulphate of mercury, or turpeth mineral, operates as a powerful emetic, and is sometimes used as an errhine. The submuriate of ammonia and peroxide of mercury, Hydrargyrum Præcipitatum Album of the London Pharmacopœia, is applied externally as a mild escharotic, and for the cure of some cutaneous diseases.

United with sulphur, mercury forms two preparations, the black sulphuret and the red. The former, which is also named Ethiops Mineral, is a bisulphuret mixed with sulphur, and is of scarcely any activity. The other, Cinnabar, is a pure bisulphuret. It is applied principally by fumigation, with the view of stopping the progress of venereal ulcers, being converted into vapour by being laid on a hot iron, and this vapour being directed on the part.

Cyanuret of Mercury is prepared by a formula of the Dublin Pharmacopœia, but only for the purpose of forming prussic acid from it.

A singular circumstance, with regard to the internal administration of mercury, has been made known by Dr. Harty, that if the sulphate of quinia be conjoined with it, the constitution is brought more rapidly under the mercurial influence, and with a less quantity of mercury; the sulphate of quinia seeming to dispose the system to receive more readily this impression. [For further information in relation to mercury, see Part II. "Preparations of the Metals."]

Ferrum. Iron.—This metal is the one which has been regarded as most salutary to the animal system; and the remark is perhaps just, that it is the only metal having any sensible activity which has no poisonous quality. Its general properties are too well known to need any description; its chemical equivalent is 28. It forms two oxides, the protoxide, composed of one atom of iron, 28, and one of oxygen, 8,=36; the peroxide, of one atom of iron, 28, and one atom and a half of oxygen, 12,=40.

When given medicinally, the effects obtained from Iron are those of a tonic; it increases the vigour of the circulation, causes the blood, it has been affirmed, to assume a more florid hue, promotes digestion, excites the secretions, or restrains them when they have been morbidly increased, and by its astringency checks profuse evacuations, and counteracts the tendency to hæmorrhage. It is in diseases of debility that it is employed, and as its operation is only gradual, chiefly in chronic affections,—dyspepsia, hypochondriasis, hysteria, amenorrhœa, leucorrhœa, passive menorrhagia, chronic catarrh, hectic, paralysis, scrofula, and rickets. It is less proper

was after sixty grains of calomel had been taken,) they immediately yielded. It could scarcely be said that salivation was induced. The case had, before the calomel was used, gone so far, that after the constitutional symptoms ceased an extensive sinus remained passing among the muscles of the shoulder, which was not thoroughly healed for ten months after.—Ed.

where there is any tendency to inflammatory action, or a plethoric state of the vessels; and its administration ought to be suspended when it renders the pulse quick in such cases, or when it occasions a sense of fulness, headach or costiveness.

Numerous preparations of this metal are medicinally employed.

The filings of iron, (Limatura Ferri,) which, for medicinal use, are purified by the magnet, are given in a dose from a scruple to a drachm or two. Their activity is probably dependent on the oxidation they suffer in the stomach from the action of the gastric fluids. They are administered mixed with a little sugar and aromatic.

The subcarbonate, or Rust of Iron, (Sub-Carbonas Ferri, Rubigo Ferri,) formed by exposing the metal to air and moisture, consists chiefly of peroxide of iron, mixed with a portion of protocarbonate of iron; as it contains only 15 *per cent.* of the acid, the name of Carbonate, sometimes given to it, is incorrect. This preparation possesses considerable activity, at the same time that it is less irritating than the salts of iron. Besides its use as a general tonic in the cases in which chalybeates are usually employed, it has been used as a remedy in cancerous ulceration, both internally administered in its usual dose, and externally applied sprinkled on the sore. Cases have been given in which this practice has proved successful, while, from the experience of others, it has appeared to operate merely as a palliative, or, at the farthest, to be of permanent advantage only in some forms of ill-conditioned ulcers not truly of a cancerous nature. It has also been much used of late, in cases of that very severe affection, neuralgia faciei,* with very decided success, so much so indeed, that it is now the usual remedy. Mr. Hutchinson first proposed it, and he gave it in pretty large doses, from half a drachm to four scruples, three times daily.† Another form of it, supposed to be more pure, is what is named Carbonas Ferri Præcipitatus, prepared by adding a solution of carbonate of soda to a solution of sulphate of iron. This was first used under the form of an extemporaneous preparation, named *Griffith's Antihectic Mixture*, which obtained celebrity as a remedy in chronic catarrh, connected with increased mucous secretion, in obstinate sympathetic cough, in phthisis and hectic. It is still used in these cases, and as a mild tonic in other affections connected with debility or morbid irritability. The Mistura Ferri Composita was introduced into the London Pharmacopœia as an improved form of this mixture, and is often beneficial as a mild tonic. The Permuriate of Iron is employed under the form of tincture. It is a

* Much interesting evidence has lately been communicated to the public concerning the efficacy of carbonate of iron in *Tic Douloureux*. To Dr. Hutchinson, a respectable English surgeon, is due the credit of originally suggesting the practice, as also of confirming it afterwards by numerous examples of its success. In a few cases, the practice has been tested in this country, and with the happiest results. Dr. Eights, of Albany, has related two cases of this disease, which yielded very promptly under the use of the iron after every other remedy had been perseveringly tried, but without effect. See New-York Med. and Phys. Journal, vol. I. p. 323. According to Dr. Hutchinson, it is to be administered in doses of from half a drachm to a drachm, two or three times a-day.—*B.*

† *Incompatible Substances.* Acids and acidulous salts, which dissolve it with effervescence.—B.

very active preparation; sometimes too much so to admit of being used in an irritable state of the stomach. Its dose is 10 or 15 drops diluted with water, or taken in wine, in which it is more grateful. If it occasions nausea or pain, the dose must be diminished. It is the preparation usually employed where the full operation of iron is to be obtained. Besides its employment in the diseases in which chalybeates are usually prescribed, Mr. Cline has mentioned a peculiar application of it in which it had proved of singular efficacy, that of suppression of urine from spasm of the urethra, 10 drops being given every ten minutes; after the sixth dose the suppression in different cases was relieved.* Muriate of iron and Ammonia is an active preparation, but apt to vary greatly in its composition.

Sulphate of iron is formed in the large way, by the oxygenation of the native bisulphuret by calcination, which expels part of the sulphur, and then exposure to air and humidity; or it is obtained more pure by dissolving iron in diluted sulphuric acid, and evaporating the solution. It crystallizes in rhomboidal prisms of a green colour.† It is one of the most active preparations of the metal, and is not unfrequently prescribed in amenorrhœa.

The Tartrate of Potash and Iron, in which protoxide of iron is combined with tartaric acid and potash, is a mild chalybeate, which may be given with advantage to patients of feeble constitution. It may be exhibited in scrofula in doses of 10 or 15 grains; it is used also as a tonic and diuretic in dropsy in a dose of 3 or 4 grains twice a-day.‡

The Wine of Iron, which has a place in the London Pharmacopœia, is prepared with iron, supertartrate of potash, and proof-spirit. The triple tartrate of potash and iron is first formed, and then dissolved in water and the spirit: in this way, however, a considerable portion of it is decomposed. It is used in chlorotic cases.

Acetate of iron has been introduced by the Dublin College, but it has no advantage to recommend it above the muriate or tartrate.

The London College have given a place to a preparation of iron, (Liquor Ferri Alkalini,) of rather a singular nature. It seems to be a combination of oxide of iron, potash and carbonic acid. Being variable in its strength, easily decomposed, and not possessed of any peculiar advantage, it has nearly fallen into disuse.

The Ferro-cyanate of Iron, or Prussian Blue, has been inserted into the last Dublin Pharmacopœia under the name of Ferri Cyanuretum, partly for the purpose, that cyanuret of mercury may be prepared from it, and partly that it has been found useful as a tonic. It

* *Incompatible Substances.* Alkalies and their carbonates, lime water, carbonate of lime, magnesia and its carbonate. By astringent vegetables it is rendered black, and by a solution of gum arabic it is decomposed.—B.

† *Incompatible Substances.* Every salt whose base forms an insoluble compound with sulphuric acid; the earths, the alkalies, and their carbonates; borate of soda, nitrate of potash, muriate of ammonia, tartrate of potash and soda, acetate of ammonia, nitrate of silver, subacetate and acetate of lead, and soaps. It is decomposed also by astringent vegetables.—B.

‡ *Incompatible Substances.* Strong acids, lime water, hydro-sulphates and astringent vegetables.—B.

has been given in intermittent fever and epilepsy in a dose of a grain or two twice or thrice a-day.*

The Mineral Chalybeate Waters afford another form under which iron may be administered. The iron is generally dissolved in them by carbonic acid; and from the state of dilution, they are sometimes used with more advantage than the more active preparations of the metals. [For further information concerning Iron, see Part II. "Preparations of the Metals."]

ZINCUM.—This metal is of a white colour, with a shade of grey; it is brittle except at a temperature between 200° and 300° of Fahrenheit, when it has considerable ductility and malleability; it is fusible at a heat approaching to that of ignition, and when raised to that temperature, burns with a bright flame, forming a white oxide.

Zinc exerts no sensible action on the system in its metallic state: it is employed, therefore, under various forms of preparation, which are in general possessed of a degree of tonic and astringent power.

White oxide of zinc, obtained usually by the combustion of the metal, in the formula of the London College, by precipitation from the sulphate, and composed of one atom of zinc and one of oxygen, has been employed as a remedy in spasmodic affections, particularly chorea and epilepsy. There are cases on record where a cure was obtained; but it is not very active or certain in its operation. An ointment composed of it is used as a healing cerate, and as an application in ophthalmia.

An impure oxide of zinc is procured from the furnaces in which zinc ores are roasted; it is known by the name of Tutia. It is of a grey colour, and earthy texture, and when levigated, is used sometimes as the basis of a cerate employed as a dressing to wounds, or applied to the eye in some forms of ophthalmia.

What has been named Calamine Stone, (Lapis Calaminaris,) is regarded as a carbonate of zinc; and it generally is so, though there

* The credit of introducing this preparation of iron into use, is due to Dr. Zollickoffer of Maryland. So high does he estimate this article in the treatment of remitting and intermitting fevers, that he gives to it a decided preference over arsenic, Peruvian bark, as well as over all the other forms of iron. Over cinchona he asserts it to possess the following advantages: viz. "1. It is void of taste, and may therefore be much more readily exhibited than the *cinch. offic.* which, to some, is extremely unpleasant. 2. It may be given in every stage of the disease, while the administration of bark is confined to the *apyrexiæ.* 3. The dose is much smaller, being from 4 to 6 grains twice or thrice in twenty-four hours; or at morning, noon, and night; while bark, to be effectual, must be given in much larger doses. 4. It never disagrees with the stomach, or creates nausea, even in the most irritable state of this *viscus:* while bark is not unfrequently rejected. 5. In its effects as a remedy calculated to prevent the recurrence of future *paroxysms*, it is more certain, prompt, and effectual than the justly celebrated *cort. peruvian.* 6. and lastly, A patient treated with this article will recover from the influence of intermitting and remitting fevers, in the generality of cases, in much less time than is usual in those cases in which bark is employed. In making use of the Prussiate of Iron as a remedy in disease, care must be taken to select that which is of a very dark blue, approaching to a black, having a shining coppery fracture, and adhering firmly to the tongue."—In this city, numerous trials have been made of this article, and generally in confirmation of the good opinion expressed concerning it by Dr. Zollickoffer. It has also been used with success in epilepsy, and in an obstinate case of periodical hemicrania, which had resisted all the ordinary remedies.—B.

are varieties of it composed of oxide of zinc and siliceous earth. It is employed only externally; the levigated powder is dusted on the skin in slight cases of excoriation and superficial inflammation, and it forms the basis of the common healing cerate.

Sulphate of Zinc is prepared on the large scale under the name of White Vitriol; it may be procured more pure, and in a crystalline form, by evaporation of the solution of zinc in diluted sulphuric acid. It has been employed in the same cases as the oxide; and Dr. Cullen has observed that it is possessed of the same powers. It has likewise been given, in the dose of a few grains, as a tonic in intermittent fever, as a tonic and astringent in chronic dysentery, and in small doses combined with bitters, as a tonic in dyspepsia. Its administration, in all these cases, requires to be conducted so as to obviate the nausea which it is liable to occasion. In a large dose it operates as a speedy yet safe emetic. As an astringent it is to be afterwards considered.* [See Part II. "Preparations of the Metals."]

Cuprum. Copper.—This metal is not, like the greater number of the metals, insipid and inodorous: it has an unpleasant styptic taste, and when rubbed, a perceptible smell. It is extremely noxious to life, and fatal accidents sometimes happen from food becoming impregnated with it. Sugar, according to Orfila, is the best antidote to it; albumen also is useful. When properly administered, copper proves a remedy of value, and, like zinc, has some claim to be ranked as a tonic, from its successful operation in epilepsy, chorea, and other spasmodic affections dependent on or connected with debility. It is also employed, under various forms of preparation, as an astringent, emetic and escharotic.

Sulphate of Copper, or Blue Vitriol, is its most important saline compound. It is obtained from the water which filtrates through copper mines, in which it exists dissolved; or it is prepared by calcining the native sulphuret of copper, and exposing it in a humid state to the air; the metal is oxidated, the sulphur, also absorbing oxygen, is converted into sulphuric acid, and the sulphate of copper thus formed is procured by lixiviation and crystallization. It is in reality a bisulphate, consisting of two equivalents of acid, 80, and one of the peroxide of copper, 80, with ten equivalents of water, 90,=250. The crystals are short rhomboidal prisms, of a rich blue colour, transparent, but liable to a slight efflorescence. This salt, though it has been given in epilepsy and incipient phthisis, is rather too active to admit of internal administration as a tonic; even in a very small dose it excites nausea and vomiting; and as a powerful emetic it is employed, where, from the state of the stomach, it is difficult to excite vomiting, as where a narcotic has been taken in too large a quantity. Externally, it is used as an astringent and escharotic.†

* *Incompatible Substances.* Alkalies and their carbonates, earths, hydro-sulphurets, astringent vegetable infusions, milk.—B.

† *Incompatible Substances.* Alkalies, and their carbonates, sub-borate of soda, acetate of ammonia, tartrate of potash, muriate of lime, nitrate of silver, sub-acetate

Acetate of copper, (Subacetas Cupri,) commonly called Verdigris, is prepared by covering copper plates with the husks of the grape, after the expression of the juice in the wine-press. A number of plates with the interposed husks being placed together, and being occasionally moistened, the vegetable matter passes into fermentation, and a portion of acetic acid is formed; at the same time the copper attracts oxygen passing to the state of peroxide, and the acetic acid uniting with it forms the acetate. The crust of salt is scraped off and beat into masses, which are dried. Verdigris is of a green colour; according to Mr. Phillips it is not, as was supposed, a subacetate, but the true acetate of copper, consisting of one equivalent of acetic acid, 51, one of peroxide of copper, 80, and 6 of water, 54, =185. When it is dissolved in water it is resolved into a binacetate, which remains in solution, and an insoluble subacetate, which is precipitated. The binacetate may also be obtained by dissolving verdigris in distilled vinegar, and on evaporation crystallizes in octohedrons of a deep green colour; this, termed Distilled Verdigris, is scarcely medicinally employed. The acetate has been employed as a form of giving copper in epilepsy, and also as an emetic; but it is chiefly as an escharotic that it is used in modern practice.

The preparation named Ammoniuret of Copper, (Ammoniaretum Cupri, Cuprum Ammoniatum,) is the one usually employed to obtain the action of copper on the system. It is a compound of oxide of copper, ammonia, and sulphuric acid. It is given in epilepsy, in a dose of half a grain twice a-day, increasing it gradually as far as the stomach or system will bear it, and continuing it until it has received a fair trial. It has in some cases proved successful, though in a disease arising from such various causes, and so frequently depending on derangement of organic structure, any remedy must frequently fail. It has been given in a similar manner with advantage in chorea and dysphagia.* [See Part II. "Preparations of the Metals."]

Arsenicum. Arsenic.—This metal occurs sometimes native, or in the state of oxide, but more generally combined with sulphur, forming the ores named Orpiment and Realgar; and frequently also associated with other metallic sulphurets. It is extracted from these by sublimation, in the state of an oxide, its oxidation being effected by the action of the atmospheric air during the volatilization; and from this oxide the arsenic is usually obtained by exposing it to heat mixed with a portion of black flux or charcoal; the metal is sublimed. Metallic arsenic is of a dark grey colour, with considerable lustre, which is however very liable to tarnish; its texture is foliated, and it is extremely brittle; its specific gravity is 5.8. It is volatile at a heat considerably inferior to that of ignition, and when in vapour has a peculiar smell, often compared to that of garlic. At the same temperature it is oxidated rapidly by the action of the air, forming a

and acetate of lead, oxy-muriate of mercury, all astringent vegetable infusions and tinctures. Iron, immersed in the solution, precipitates copper in a metallic form; hence the exhibition of the filings of iron has been proposed as an antidote. Paris.—B.

* *Incompatible Substances.* Acids, the alkalies, potash and soda, and lime water.—B.

white smoke, which condenses. At a higher temperature it burns, and affords the same product. This product used to be regarded as an oxide. Being soluble, however, in water, capable of crystallizing, reddening the infusion of litmus, and combining with the alkalis, it is considered as an acid, and is named Arsenious Acid. It consists of one atom of arsenic, 38, and two atoms of oxygen, 16,=54. With an additional atom of oxygen, arsenic forms an acid of considerable power, the Arsenic Acid.

The Arsenious acid, or oxide of arsenic, is usually obtained by sublimation in the roasting of various metallic ores, particularly those of cobalt, in which it exists. The sublimate, at first impure, is again sublimed, and is thus obtained in the form of an opaque white dense cake, which is reduced to powder, for the uses to which it is applied. Its taste has usually been said to be acrid and penetrating; but Dr. Christison shewed that this was a mistake, and that its taste is scarcely perceptible, or rather sweetish. The inflammation which follows gives the impression of its being an acrid substance. It is volatilized at 380°; its vapour has not the garlic odour which distinguishes the metal. It is soluble in 15 parts of boiling water, and in 100 parts of cold water; if it be in mixture with organic substances, such as tea or milk, its solubility is much less.

This substance has been long known as the most virulent of the mineral poisons. In a very small quantity, it occasions vomiting, purging, tremors, and paralysis; in a quantity a little larger, it excites severe pain in the stomach, with a sense of heat extending from the œsophagus, extreme thirst, violent vomiting, with anxiety and depression. The pain extends over the abdomen, respiration becomes difficult, the pulse is small, quick, and irregular; the vomiting is incessant, accompanied with tremors, convulsions and fainting; there is a sense of coldness, sometimes with cold sweats; paralysis frequently supervenes, and the patient dies exhausted. On dissection, the internal surface of the stomach and upper part of the intestines is found inflamed; the inflammation is usually confined to the mucous membrane, which has often a florid red colour, is soft and pulpy, and easily detached; the blood-vessels on its surface are frequently turgid, and sometimes there are small spots of extravasated blood; signs of putrefaction, it has been said, appear sooner than in other cases of sudden death, but this is doubtful, as well as the appearance of livid spots on the skin, which has been said to occur: the blood is usually fluid, and the body is frequently swelled.

All the effects of arsenic, it has been established, are produced by its incautious external application, and they appear with violence when the arsenic is applied to a wound. Some facts which had been partly known with regard to this have lately been confirmed by the experiments of Mr. Brodie, so as to lead to a more peculiar view of its mode of operation. When applied externally to a wound, it occasions death even more speedily than when it has been received into the stomach, and with similar symptoms; vomiting and purging, in particular, are produced to as great an extent, and on dissection the stomach and intestines are found to be inflamed. This shews the determination of its action to these parts; and as the inflamma-

tion of the stomach is found even to precede any appearance of the inflammation of the wound, so that the former cannot be considered as connected by sympathetic action with the latter, it, as well as the general affection of the system, probably arises from the arsenic being received into the circulation through the divided blood-vessels of the wound. Though the inflammation of the stomach, which follows from its internal administration, may arise from its direct application, it is possible that it may be produced in this indirect mode by its entering the circulating mass.

Though so violent in its operation, arsenic has been frequently employed in medical practice; and when properly administered, we obtain from it, in certain diseases, all the advantage which is derived from the operation of the most safe and powerful tonic. This is well displayed in its efficacy in the treatment of intermittent fever, the disease in which it has been principally used.

The common form under which arsenic is administered, is that of the Solutio Arsenicalis of the Colleges, analogous to one which had been known under the name of Tasteless Ague Drop.* It is prepared by dissolving sixty-four grains of the white oxide, and the same quantity of sub-carbonate of potash, in sixteen ounces of water, adding half an ounce of compound spirit of lavender. This is given in a dose of four drops, three times a-day, which is gradually increased to double that quantity; its administration being occasionally intermitted, not too long persisted in, and immediately relinquished if it occasion nausea or purging, vertigo, headach, or cough, or indeed any particular indication of the system being much under its influence. Under this form arsenic has been given in remitting fever, in periodic headach, in tic doloureux, as an antidote to the poison of venomous animals, in hydrophobia, lepra, and elephantiasis; and in some of these diseases with very marked advantage, in cases where other remedies have failed. In some forms also of epileptic affections it has been administered with success. In chorea much advantage has been derived from it according to the statements of Dr. G. Gregory and Mr. Salter. The administration of arsenic always requires, however, to be conducted with much care. Even in the small doses in which it has been administered medicinally, it is liable to exert its deleterious agency. It often excites nausea, pain at the stomach, and purging; sometimes pain in the forehead, with a sense of tension, a stiffness of the palpebræ, soreness of the mouth, and increase of the salivary discharge; and when its operation proceeds still farther, it excites severe symptomatic cough; these effects sometimes arise even from its external application. Whenever they appear, the dose ought to be diminished; and if they become urgent, the use of the remedy ought to be immediately suspended. Orfila states from his own observations, that given even in very minute doses, and with all possible precaution, it not unfrequently excites a predisposition to organic diseases of the heart. It has been recommended that doses of arsenic should be given after meals, there being less risk of its acting injuriously on the stomach. In

* *Incompatible Substances.* Lime water, nitrate of silver, the salts of copper, hydro-sulphuret of potash, and the infusions and decoctions of bark.—B.

some of the affections where its full operation must be immediately obtained, as where it is used as an antidote to the bite of serpents, it requires to be given in a larger dose,—that of a grain.

Externally, arsenic is used in schirrus and cancer; applications of it to be noticed under the class of Escharotics.

The antidotes which have been employed to counteract the poisonous operation of arsenic are various. Vomiting, if not produced by its action, which it generally is, must be immediately excited, and as the stomach is highly irritable in such cases, the milder emetics may be used. Fat and oils have been recommended, but according to the experiments of Renault, appear rather to favour the action of the arsenic; tepid water, or mucilaginous liquors, ought to be preferred. Reliance has been placed on solutions of the alkaline sulphurets, or of sulphuretted hydrogen. These appear, from Renault's experiments, to have some power if the arsenic be in a state of solution, precipitating it in the state of sulphuret when it is less noxious, but if the arsenic be in the solid form they are of no efficacy. A solution of soap has been recommended, and it has the advantage of being easily procured. As the effects from arsenic are those denoting inflammatory action in the system, and as even the inflammation of the stomach and intestines seems to be the consequence of this as much as of any local operation of the arsenic itself, blood-letting would appear to be indicated, and, in a case of such urgency, might be carried to a considerable extent with advantage. In a case related by Dr. Roget, in which blood-letting was suggested by the evident inflammatory affection of the stomach, eighteen ounces of blood were drawn from the arm, the patient fainted, and remained half an hour in a state of insensibility. The violent affection of the stomach, however, was relieved, and, after a succession of various symptoms indicating affection of the nervous as well as of the vascular system, the patient recovered, though with difficulty, and was restored to health. But as blood-letting promotes absorption, it should not be employed till by vomiting the arsenic has been removed from the stomach.

The medical practitioner has sometimes to determine, in cases of judicial investigation, whether a person has been poisoned by arsenic or not. This can scarcely be inferred with certainty from the symptoms, nor even from the state of the stomach ascertained by dissection; for although inflammation is usually present, and has the characters stated above, it is not invariably so; or when it is present, the appearance is sometimes slight. Recourse, therefore, is had to the chemical tests.

These can be applied with certainty, only when a portion of oxide of arsenic has been procured, either from the contents of the stomach discharged by vomiting, or carefully collected and examined after death, or when it has been thrown down in the solid form when dissolved in these fluids by the use of re-agents. Any indication of its presence, deduced from a mere change of colour or formation of a precipitate, which is not submitted to a farther examination, cannot be depended upon. Care, therefore, should be taken to collect any solid arsenic from the stomach, which is done by minute inspection

of the inner surface of the stomach, and by washing it carefully, and allowing the matter to subside from the fluid, or from the fluid which had been discharged by vomiting. Unless the fluid be very thick, the arsenic, being of considerable specific gravity, will subside, and if a very minute quantity be procured it may be identified. The best method of conducting the experiment is the following, first employed by Dr. T. S. Traill, (Ann. of Phil. N. S. vii. p. 132). A portion of the suspected solid matter is mixed with twice its weight of the black flux. The mixture is put into a slender glass tube, hermetically closed at the one end, open at the other, and made perfectly clean and dry. To prevent any of the mixture adhering to its sides, it should be allowed to run down in a small piece of paper to the bottom of the tube, which is then to be held in the flame of a spirit lamp. The arsenic will be reduced to the metallic state, will rise in vapour, and form a brilliant crust on the inner surface of the tube; this appearance can be presented by no substance but arsenic, and is therefore decisive; it may be rendered even more satisfactory by applying heat to the arsenical crust, so as to cause it to be again volatilized and pass higher up in the tube. In passing up it becomes oxidated, and crystals of arsenious acid are formed in the tube, which are characterised by their octohedral form and resplendent lustre, so that they cannot be mistaken.

Such is the test for recognising arsenic when procured in the solid form; it is not liable to error, and is so delicate that Dr. Christison detected, by means of it, the 280th part of a grain. When the arsenic is dissolved in the fluids in the stomach, it is more difficult to apply tests free from ambiguity; yet there is one test which has been applied with great success by Dr. Christison, and seems to be liable to no error but what can be guarded against, it is that of sulphuretted hydrogen. A current of this gas is conducted through the suspected liquid, and if arsenic be present, a yellow-coloured precipitate will gradually be formed, which is the sulphuret of arsenic. One condition only is essential to ensure success, that there be no free alkali present to redissolve the sulphuret, to prevent which the liquid must be previously acidulated with muriatic or acetic acid. When the sulphuret of arsenic is thus obtained, it is to be treated with the black flux in the mode which has been explained, and the brilliant metallic crust will prove the presence of arsenic.

The most difficult case is where the fluids in the stomach contain a quantity of coloured organic matter, such as an intermixture of tea, porter, wine, or other liquids containing vegetable or animal matter These change the colour of precipitates, so that several tests, which with a pure solution of arsenious acid are unexceptionable, with such mixed fluids cannot be depended upon; and they interfere with the subsequent processes of volatilization and reduction. It has been proposed to remove at least the colour from mixed liquids of this kind, by means either of chlorine or animal charcoal; but the charcoal precipitates the arsenic, and the chlorine converts it into arsenic acid. It is to the sulphuretted hydrogen we must trust; and in applying it, the easiest method is to filter the fluids, boil down to dryness, redissolve the solid matter, which will be freed from much

of its previous impurity, then pass the sulphuretted hydrogen gas through the solution, and reduce the metal in the way that has been described.

For the reduction of oxide of arsenic Dr. Christison prefers charcoal powder; but for reducing the sulphuret of arsenic, the black flux must be used. This is prepared by deflagrating a mixture of bitartrate of potash with half its weight of nitre. In the burning the nitric and tartaric acids are decomposed, and the residue consists of the charcoal of the latter acid, in intimate mixture with carbonate of potash. When the sulphuret of arsenic is treated with this substance the potash attracts the sulphur, and the arsenic is volatilized.

By means of sulphuretted hydrogen Dr. Christison has detected arsenious acid in complicated mixtures of fluids, when it was not in larger proportion than a fourth of a grain in an ounce.

There are two tests applicable to fluids containing arsenious acids, which used to be much trusted to, and in pure solutions give indications of much delicacy and precision, but in mixed liquids are so liable to fallacy, that no dependence is now placed upon them. One of these is the ammoniacal sulphate of copper, prepared by adding an excess of ammonia to a solution of sulphate of copper. On the first addition of the alkali, a precipitate falls of a bluish green colour, but this is redissolved on adding an excess of ammonia. When the solution so prepared is poured into a fluid containing arsenious acid, a precipitate is formed of a bright grass green colour, known by the name of Scheele's green. The other test is that of the ammoniacal nitrate of silver; it is prepared in the same way, by adding ammonia to the solution of nitrate of silver, till the oxide of silver, which is at first thrown down, is redissolved. This solution, dropped into a fluid containing arsenious acid, produces a precipitate of a lively yellow colour. These tests ought to be tried in day light, that the shades of colour may be better perceived. And an elegant mode of performing them proposed by Dr. Paris, which also obviates some of the sources of fallacy, is to drop the suspected liquid on a piece of paper, and draw across it a glass rod dipt in the ammoniacal solutions. These tests can be relied on when the arsenic is dissolved in pure water; but Dr. Christison has shewn that the presence of animal or vegetable matter renders them very equivocal; the organic matter changing the colours of the precipitates, so that the characteristic tints cannot be distinguished, and even causing precipitates to be formed where there is no arsenic present; and, on the other hand, vegetable acids and astringents may prevent precipitation where arsenic really exists.

A test which has been much employed, is that of placing the suspected matter, made into a paste with oil, on a piece of red hot iron; it volatilizes in a white smoke; and, if arsenic be present, it will, when evaporating, give a peculiar smell, resembling that of garlic; or by heating a small piece of the reduced metal, it will be volatilized with the same odour. A vapour may arise, however, from the intermixture of other matter in small quantity; this, too, may disguise the smell, and there is room for the influence of imagination in judging of the odour. This test, therefore, is not to be relied on.

For more complete information as to the methods of detecting arsenic, it may be sufficient to refer to the work of Dr. Christison on Poisons. [See Part II. "Preparations of the Metals."]

Bismuthum. Bismuth.—This metal is of a white colour, with a shade of yellow, has a foliated fracture, is brittle, fusible, capable of being volatilized, and easily susceptible of oxidation. The subnitrate or trisnitrate has been employed with advantage in gastrodynia, pyrosis, and other affections connected with debility of the digestive organs. It is given in a dose from two to six grains, two grains being given twice or thrice a-day, or, in more severe cases, five grains being given at once. In these doses it usually produces a remission of pain, and ultimately a removal of the morbid state from which this has arisen; no bad consequences arise from its exhibition. [See Part II. "Preparations of the Metals."]

Barytes.—This earth is found in nature combined with sulphuric acid, and with carbonic acid. The native carbonate was known to prove poisonous to animals, and the degree of activity which this indicated suggested the application of it to medicinal purposes. The form under which the barytes has been used is in combination with muriatic acid; for the preparation of which two processes are inserted in the Edinburgh Pharmacopœia. It is a substance of great activity, acting as a poison when given in too large a quantity; it occasions reduction of the force of the circulation, insensibility and paralysis, and on dissection the stomach is frequently found inflamed. The same effects arise from its application to a wound, and with great rapidity; the symptoms indicate the brain principally to be affected; and on dissection, if a large quantity has been applied, that organ is found to be inflamed. Barytes is detected by sulphuric acid, which forms a white precipitate, insoluble in nitric acid. When it has been taken as a poison, diluents should be given, holding the sulphate of soda or magnesia in solution, which convert it into sulphate of barytes, a substance quite harmless; vomiting should then be excited. Muriate of barytes has been employed as a remedy in scrofula, in cancer, some forms of syphilis, and in hectic fever connected with ulceration, but is now scarcely ever used. Its dose is 5 drops of the saturated solution, gradually increased to 20 or more. [See Part II. "Earths and Earthy Salts."]

Calx. Lime.—This earth exists in nature combined with carbonic and other acids. From the native carbonate it is obtained by expelling the carbonic acid by heat. It is soluble in water in small quantity; the solution has a styptic taste, and is the form under which lime has been medicinally employed. Lime water is used with advantage in dyspepsia; its beneficial effects arise principally from its tonic and astringent quality, as, in the small quantity which water can dissolve, it can have little effect by any chemical agency in obviating acidity. It is employed, too, as an astringent in chronic diarrhœa and leucorrhœa, and as a lithontriptic.* Carbonate of lime is

* *Incompatible substances.* Acids, alkaline carbonates, metallic salts, phosphates,

used as an antacid; and Phosphate of lime has, from theoretical views, been proposed as a remedy in rickets and mollities ossium. Muriate of lime is a more active substance, and more powerful tonic; it is prepared by decomposing carbonate of lime by muriatic acid, and is obtained in the state of a saturated solution. In its action on the system it has a considerable analogy to muriate of barytes, and, like it, has been used in scrofula and hectic fever, and in dyspepsia. Dr. A. T. Thomson recommends it in bronchocele, and considers it of more efficacy in scrofula than any other remedy. Its dose is half a drachm of the saturated solution; and as it is a medicine of considerable activity, it requires to be given with caution. Like other saline substances designed to act on the general system, it is probably most successful when administered in small doses, with large dilution; as in large doses, and a more concentrated state, its absorption is counteracted, and its action is confined to the intestines. Hence, probably, the greater benefit derived from it in scrofulous affections under the form of mineral waters, of which it is not unfrequently an ingredient. [See Part II. "Earths and Earthy Salts."]

Acidum nitricum. Nitric Acid.—This acid is the product of the saturation of nitrogen with oxygen, and consists of one equivalent of nitrogen, 14, combined with five of oxygen, 40,=54; in its usual form it is always combined with two proportions of water, 18; the liquid acid is accordingly represented by the number 72. It is obtained by decomposing nitrate of potash by sulphuric acid, assisted by heat; the sulphuric acid combines with the potash, and the acid of the nitre distils over in the state of nitrous acid; this exposed to a gentle heat loses the portion of nitric oxide gas loosely dissolved in it, and is converted into nitric acid. It is colourless; emits white fumes; its specific gravity is 1.5; it is corrosive; acts with energy on inflammables and metals from parting with oxygen readily, and is eminently possessed of all the acid properties.

The tonic powers of this acid are conspicuous in supporting the system under the irritation of a mercurial course. As a remedy against lues venerea, it was some years ago introduced into practice, and received an extensive trial. Very discordant opinions were for a time maintained with regard to its powers, but the question appears now to be sufficiently determined. There can be no doubt that the primary symptoms of syphilis are often removed by its use, and that even the secondary symptoms are alleviated, or altogether disappear; venereal ulcers heal, enlargements of the glands subside, venereal pains become less severe, eruptions become less vivid or entirely fade, and the vigour of the system is improved. But, even in producing these effects, nitric acid frequently fails, and it appears to be established, that, when it has removed the symptoms, its action is not in general sufficiently powerful or permanent to eradicate the syphilitic poison; the symptoms recur, or the disease appears, after some time, in one or other of its secondary forms.

borates, tartrates, citrates, sulphur, and, astringent vegetable infusions. To preserve it, it should be kept in close vessels. If exposed to the air, the lime attracts carbonic acid, forming an insoluble carbonate.—B.

Though in this respect nitric acid is inferior to mercury, and cannot be relied on alone in the treatment of syphilis, there are other important indications which it fulfils, and which render it a remedy of value. It supports the strength of the system under the irritation of mercury, and wherever this remedy requires to be given to a considerable extent, is in this respect advantageous; it appears even to promote, in many cases, the operation of mercury; symptoms, especially those of constitutional affection, disappearing under their combined administration, which are more slowly removed, or resist the administration of the latter alone. In cases, too, where from circumstances mercury cannot for a time be given to the requisite extent, the symptoms are arrested by the use of the acid, or where some secondary symptoms, ulceration of the throat in particular, are making a rapid progress, they are more speedily checked when it is given; though still in these cases the precaution is proper, of employing as much mercury as would have been judged necessary alone for their removal. Mr. Carmichael states, that when dropsy supervenes after repeated courses of mercury, the exhibition of the nitric acid combined with digitalis, and given in as large doses as the stomach will bear, is attended with great benefit.

There are other diseases in which it is administered with advantage, particularly in that chronic affection of the liver frequently arising from residence in a warm climate, in dyspepsia, with the view of relieving sickness, and anorexia, and in obstinate cutaneous eruptions. Its medium dose, in its continued administration, is from one to two drachms in twenty-four hours; the latter quantity in general cannot be exceeded, without nausea or griping being produced. It is given largely diluted with water, adding usually a little sugar, so as to form a beverage not unpleasant. This forms an excellent acidulous draught, which may be given also with much benefit in various febrile diseases; Dr. Duncan informs us, that he found it very useful in the lower typhus which occasionally prevails among the poor in the suburbs of Edinburgh.* [See Part II. "Salts."]

Acidum nitro-muriaticum. Nitro-muriatic Acid.—This compound acid is formed by mixing one part of nitric acid with two parts of muriatic acid. It has a place as yet only in the Dublin Pharmacopœia. The use of it was introduced by Dr. Scott of Bombay, in the form of a bath, in cases of hepatitis and other liver complaints. The acid is diluted with water, in the proportion of an ounce and a half of acid to a gallon of water, forming a solution not more sour than vinegar, and in this bath the feet and legs are immersed for half an hour. The bath should be repeated daily for some weeks. It is said to produce a peculiar taste in the mouth, thirst, and a tingling sensation in the skin, attended with beneficial effects on the biliary system. The acid solution may also be applied to the surface of the body by means of a sponge. Dr. Scott found

* *Incompatible Substances.* Oxides, earths, alkalies and their carbonates, the sulphurets and the acetates of lead, and potash. The two last are decomposed by it, and nitrates of lead and potash are formed.—B.

this application to give instant relief in the passage of a stone through the gall-duct. [See Part II. " Salts."]

[AURUM. *Gold.*

It is unnecessary to dwell upon the physical and chemical properties of this metal. As a medicine it appears to have been known as early as the times of the Arabians, and is even said to have enjoyed among them no inconsiderable popularity. Subsequently to this it seems to have lost all its reputation, and it had for a long time been struck from the list of medicines, when a French physician at Montpellier, Dr. Chrestien, revived its use, and in 1811 called the attention of the public to it in a work entitled "*De la Methode Jatraleptique*," in which he proposes gold as a *new remedy for the treatment of venereal and lymphatic disorders*. According to the representations contained in this work, it would appear, as the result of a lengthened experience on the part of the author, that Gold is capable of curing syphilis under all its various forms ; and that moreover it possesses many and decided advantages over mercury. Its effects upon the system are efficacious and gentle. It produces no salivation—nor does it in any way disturb the general health during its use, the only sensible effects produced by it being an increase of urine and of perspiration. It may be administered with perfect safety at any season of the year, and under any complication of the disease. Persons of either sex may be put upon its use with equal security. The only precaution which he enjoins during its administration is the strict observance of temperance. In other respects the patient is not required to change his accustomed mode of living. In addition to its antisyphilitic virtues, Dr. Chrestien recommends the use of gold in glandular swellings, gleets, schirrus of the womb ; in the latter complaint more especially, he speaks of its efficacy with great confidence. Very shortly after the appearance of this work in France, our distinguished countryman, Dr. Samuel L. Mitchill made the medical public in this country acquainted with its contents, and immediately commenced a series of experiments with the gold in the New-York Hospital. The result of his experience is contained in the following letter addressed to the late Dr. Dyckman : "The efficacy of the medicine has been tried year after year in the New-York Hospital. My practice with it there, has been witnessed by all the attendants of the wards. It possesses admirable virtues against syphilis. Without presuming to affirm that it is capable of eradicating the distemper in every instance, my opinion upon the whole is that the muriate of gold will effect all that is achieved by muriate of quicksilver, with incomparably less inconvenience to the patient. He gets well under the operation of the former without the hazard of a sore mouth or a salivation, and with very little wear and tear of constitution. I consider the introduction of this preparation into common use, as one of the greatest improvements in modern medicine : and I wish it was already as universal as the malady it is intended to remove. The muriate of gold is found to increase the quantity of urine, in many instances, to such a degree, that it ought to be ranked among the diuretics of the Materia Medica." In 1812

an inaugural dissertation "on the Medical properties of Gold" was published in this city by Dr. J. C. Cheeseman, in which are detailed a number of cases of primary syphilis which had been successfully treated by this remedy in the New-York Hospital; and since that period a still larger number of successful cases have been reported at that institution. The results of the whole experience on this subject at the New-York Hospital seem to be these:

1. In the treatment of primary syphilis muriate of gold possesses powers fully equal to those of mercury.

2. In cases cured by gold secondary symptoms do not supervene more frequently than in cases which have been cured by mercury.

3. In secondary syphilis gold is not to be depended upon for a radical cure.

Having never had occasion to administer the gold myself, I am unable, from my own experience, either to confirm or to contradict the preceding testimony; I am, however, acquainted with more than one physician in this city who is in the constant habit of using this remedy, who expresses himself entirely satisfied with its effects. At the same time it is proper to mention that very opposite opinions are maintained by some of our most respectable physicians. Much of the discrepancy which pervades the testimony in relation to this subject, may perhaps be accounted for by the fact already noticed, that it is only in its primary stage that gold is adequate to the cure of syphilis.

With regard to its use in other diseases our knowledge is more limited. By Dr. Eberle it was administered in a case of scrofula, and succeeded in healing very rapidly the ulcerations. The cure, however, he states, was not permanent. From its very decided diuretic properties much was expected in the treatment of dropsies, and in a few cases it has been attended with the happiest effects. The late Dr. James Low, of Albany, relates that he tried it in a well marked case of ascites, and that it "was attended with more than the expected success." In the New-York Hospital a similar result has followed its exhibition. In the management of certain forms of dropsy, therefore, there is reason to believe that it may become a very valuable auxiliary.

Various preparations of the metal were tried by Dr. Chrestien: as the metallic divided gold—oxide of gold precipitated by potash—oxide precipitated by tin—triple muriate of gold of soda: and these were applied by friction to the gums. In this country the medicine has been given internally, generally in the form of the muriate. The method of preparing it according to the Pharmacopœia of the United States is the following, viz. take of pure gold, any quantity. Dissolve it by means of a moderate heat, in a mixture formed by uniting one part of nitric acid with two parts of muriatic acid; evaporate the solution to dryness by a gentle heat; add to the residuum an equal weight of muriate of soda, and mix them thoroughly together. Dissolve the mixture in distilled water, and evaporate slowly to dryness. Collect the mass and keep it in a glass-stopped phial, which should be accurately closed and preserved from the action of light. The dose of the muriate is from one fifteenth to one

fourth of a grain, given in pills every six, eight, or twelve hours, according to circumstances.—B.]

### TONICS FROM THE VEGETABLE KINGDOM.

The tonic power of vegetable substances is intimately connected with certain sensible properties which they possess, particularly with bitterness, and the aromatic quality. In those tonics in which these qualities are blended, they are their most distinctive properties: and in those vegetables in which either of them is predominant, we discover a degree of tonic power, or at least of that stimulating operation on which this power depends.

The vegetable products in which bitterness, without any other sensible medicinal quality, predominates, have more or less of a tonic power; the stimulant operation on which this is dependent seems, however, to be not much extended over the system; hence bitters have scarcely any sensible effect in augmenting the force of the circulation or the heat of the body, in increasing the secretions, or in stimulating to action any particular part; their operation is principally in giving vigour to the stomach and other digestive organs, and obviating those symptoms connected with debility of these organs. Still their operation is not entirely local; they prove tonic to the general system, not only indirectly by their action on the stomach, but by a more direct operation. This is displayed in their power of removing diseases connected with general debility, as intermittent fever, or the different species of dropsy, particularly anasarca, which so frequently depend on diminished energy of the absorbents. The injurious consequences which sometimes arise from the use of bitters too long continued, afford another proof of their action on the general system.

Several of the vegetable bitters have been proved to owe this quality to the presence of peculiar proximate principles. These generally belong to the class of vegetable alkalis. They exist in combination with the vegetable acids, and are for the most part mixed with portions of gum, tannin, extract, and other vegetable principles, from which they are often separated with great advantage, before they are employed for the cure of disease.

Aromatics, or Carminatives, are more stimulant and diffusible in their action than bitters; they stimulate the general system, and augment the force of the circulation; but this is scarcely sufficiently permanent to admit of their being administered with advantage as tonics. They are, therefore, rather employed as temporary stimulants, to obviate debility of the digestive organs, or as promoting the action of bitters. Still, as strictly connected with the substances belonging to this class, I have not hesitated to place them under it. There is one general virtue they possess, and for which they are often used, that of preventing or relieving nausea: this they do partly from their agreeable taste and odour, and partly probably from their stimulant operation on the stomach. The aromatic quality, in general, resides in their essential oil; hence it is communicated both to water and alcohol by infusion: their oils are usually pungent

and stimulant, and their distilled waters and spirits partake of these powers.

From the qualities which bitters and aromatics possess, the stimulant operation of the one being slow and permanent, that of the other being more diffusible and transient, it might be inferred, perhaps, that their combination will afford a superiority of tonic power. In the most powerful vegetable tonics, accordingly, these qualities are generally blended; these may be placed first, and from them there is a series to the more pure bitters and aromatics.

CINCHONA OFFICINALIS. *Cortex Peruvianus.* Cinchona. Peruvian Bark. *Pentand. Monogyn. Contortæ,* Linn. *Rubiaceæ,* Juss. *Cortex. Peru.*

THE natural history of the genus Cinchona is even at present imperfectly elucidated. Linnæus had described a species under the name of Cinchona Officinalis, the characters of which were indistinctly given under this general name. The species of this genus, it now appears, are numerous, most of them natives of Peru. The British Colleges, on the authority principally of Mutis and Zea, refer the kinds of bark used in medicine to three species, namely,

| | | | |
|---|---|---|---|
| Pale Bark, | Cinchona lancifolia. | Cortex. | Cinchona officinalis. |
| Red Bark, | Cinchona oblongifolia. | Cortex. | Cinchona rubra. |
| Yellow Bark, | Cinchona cordifolia. | Cortex. | Cinchona flava. |

These barks appear to be procured and prepared in a similar manner. The bark is stripped from the trunk and branches during the dry season; it is dried by exposure to the sun, and, after being imported into Europe, is sorted by separating the finer from the coarser.

The Pale Bark is considered as the bark of the Cinchona Lancifolia of Mutis, though it is very probable that, as it occurs in commerce, it is also furnished by other species. The tree producing it is found in the mountains of Quito and Santa Fe; what is brought from Loxa is regarded as of superior quality. The best kind met with in the shops is in thin pieces, singly convoluted, forming small quilled twigs, internally of a cinnamon colour, smooth, but fibrous in the texture; externally it is covered with a thin epidermis of a greyish-brown colour, to which a crust of lichen sometimes adheres; it breaks close and smooth, and is friable between the teeth; its powder is of a pale colour. There are often intermixed with this what is considered as bark of inferior quality, in thicker pieces, flat, or very little convoluted, rougher externally, and of a more distinctly fibrous texture. The taste of pale Peruvian bark is bitter, and slightly astringent; its flavour is slightly aromatic, with a degree of mustiness.

The Red Bark is the bark of the Cinchona Oblongifolia of Mutis, a tree of considerable size, which grows on the Andes. It is in large thick pieces, usually flat, though sometimes quilled, externally covered with a brown rugged epidermis, internally more smooth and compact, but fibrous, the fibres being coarse, of a dark red colour; its taste and smell are similar to those of the pale, but the taste is

rather stronger, and more astringent. It first appeared in Europe about the year 1780.

The Yellow Bark, so named, not from its colour being distinctly yellow, but because it approaches more to that than the colours of the others, is the bark of the Cinchona Cordifolia of Mutis. It was imported as a new variety not many years ago; but it has been stated to be that which was first known, though the importation of it had ceased, and to be therefore the real Peruvian bark. It is in flat pieces, not convoluted like the pale, nor dark-coloured like the red; is extremely smooth, internally of a light cinnamon colour, friable, and fibrous; it has no peculiar odour different from the others, but a taste much more bitter, with scarcely any sensible astringency.

The analysis of bark has been executed by a number of able chemists, and by successive steps the principles have been detected on which its activity depends. Dr. Duncan junior was the first who pointed out the existence of a peculiar vegetable principle in bark, which had not been observed before, and gave it the name of Cinchonine. Dr. Gomez obtained this substance in a crystalline form; and by the able researches of MM. Pelletier and Caventou, the analysis of bark has been in a great measure completed, and processes given for separating the various principles which it contains from each other.

It is now ascertained that the medicinal virtues of bark reside in two distinct proximate principles, Cinchonia and Quinia, which exist in various proportions in the different varieties of bark; they belong to the class of vegetable alkalis, and may be obtained by analogous processes. In the Pale Bark, (Cinchona lancifolia,) cinchonia is present in considerable quantity, but there is very little quinia; the Yellow Bark, (Cinchona cordifolia,) on the other hand, abounds in quinia, and contains very little cinchonia; while the Red Bark, (Cinchona oblongifolia,) contains both in considerable proportion; and this explains why it has generally been found to be more active than these, though some have considered the yellow bark to be the more powerful, from its having a stronger bitter taste.

Cinchonia is obtained in the following manner: The Red or Pale Bark is boiled in alcohol until it loses its bitter taste, and the decoction evaporated to dryness in a water bath, dissolved in water, acidulated with muriatic acid, and precipitated by magnesia. The precipitate is then digested repeatedly in boiling alcohol, which deposits cinchonia as it cools, after it has been evaporated to a proper strength. Cinchonia crystallizes in needles, which are of a white colour and semi-transparent. It requires 700 parts of cold water for its solution, but is much more soluble in alcohol and acids, which develope its strong bitter taste; it is sparingly soluble in the fixed and volatile oils, and in sulphuric ether.

Quinia may be obtained from the Yellow Bark, by the same kind of process used to procure cinchonia. It cannot be crystallized in the usual way, though Pelletier and Dumas have succeeded in communicating to it a crystalline texture by fusing it *in vacuo*, and allowing it to cool slowly. Its taste is intensely bitter; it is sparingly

soluble in water; changes vegetable colours to green, and combines with acids.

These two alkalis are analogous in many of their properties, but are distinguished by the cinchonia being crystallizable, which the other is not, by the former being less bitter, and by the characters of their salts being different. Their composition is stated in the Table, p. 39. Mr. Brande could not detect oxygen in cinchonia, but according to later analyses this element exists in it. In bark these alkalis exist in combination with a peculiar acid discovered by Vauquelin. It was by him named Kinic acid; but the more correct appellation of Cinchonic acid, introduced by Dr. Duncan junior, is now employed.

Peruvian bark contains, besides the alkalis, a green fatty matter, a red and yellow colouring matter, cinchonate of lime, a small portion of tannin, starch, and ligneous fibre; it has been lately stated, that another alkaline principle may be procured from it, to which the name of Cinchonoidea is given.

The comparative medicinal activity of the different kinds of Peruvian bark is often not easily determined, owing to the variable state in which they are fonnd in the shops. The red, at its first introduction, was represented as much superior in efficacy to the pale; and this appeared to be confirmed by chemical experiments on the proportion of active matter in it to that of the ligneous fibre; but there is some reason to doubt of this superiority with regard to the red bark now usually met with. The yellow bark has a much greater degree of bitterness, and some clinical observations appear to establish its superior medicinal power. According to Mutis and Zea, it is far superior to the other species in curing intermittent fever, and they regard it as the only species directly febrifuge. If even its superiority be admitted, its intense bitterness renders it unpleasant, and liable to occasion nausea, at least unless it be taken in a dose inferior to that of the other.

The effects of Peruvian bark* are those of a powerful and permanent tonic, so slow in its operation as to be scarcely perceptible by any alteration in the state of the pulse, or of the temperature of the body. Its tonic power is inferred, therefore, principally from obviating states of debility; and it is one of those medicines, the efficacy of which in removing disease is greater than could be expected, *a priori*, from its effects on the system in a healthy state. The only effects from too large a dose are nausea and headach.

Intermittent fever is the disease for the cure of which bark was introduced into practice, and there is still no remedy which equals it in power,—a superiority of which, from its known operation, it is difficult to give any explanation. Little diversity of opinion now exists with regard to the rules regulating its administration. It is given in the earliest stage of the disease, and without any previous preparation, farther than the exhibition of an emetic to evacuate the stomach; and it may be employed with safety and advantage in

* *Incompatible Substances.* Sulphate of zinc, nitrate of silver, perchloride of mercury, salts of iron, tartarized antimony, solutions of arsenic and vegetable astringent infusions.—B.

every period of the fever. It has been supposed more effectual when given before the recurrence of the paroxysm, and that, from this mode of employing it, less is required for the cure. The usual practice, however, is to give it in doses of a scruple or half a drachm every fifth or sixth hour during the interval of the paroxysm, until the recurrence of the accession is prevented. It requires to be given for some time, and continued after the fever has been removed, in order more effectually to guard against a relapse.

In remittent fever it is given with equal freedom, even though the remission of the fever may be obscure, and frequently with advantage. The remissions become more distinct, and the febrile state is at length subdued. And in all those obscure and often protracted forms of febrile affection, which observe periodic exacerbations, it is often beneficial.

In those varieties of continued fever which are connected with debility, as in typhus, cynanche maligna, and confluent small-pox, &c. Peruvian bark has been regarded as a valuable remedy. In modern practice, however, bark is less employed in typhus than it was at one period, preference being given to the more powerful exciting operation of opium and wine. It has been regarded as even hurtful in those forms of fever where the brain or its membranes are inflamed, or where there is much irritation, marked by subsultus tendinum, and convulsive motions of the extremities. Considerable advantage is sometimes derived from it in the convalescent stage of the disease. It has also been employed with much benefit in tedious cases of fever attended with sloughing of the sacrum.

Even in diseases of an opposite type, where there are marks of inflammatory action, particularly in acute rheumatism, bark has been found useful, blood-letting being generally previously employed.

In erysipelas, in gangrene, in extensive suppuration, and in scrofulous and venereal ulceration, the free use of cinchona has been regarded as of the greatest advantage. In some of these diseases, however, the slowness of its operation renders it less effectual, and this is not easily obviated by any increase which can be made in the dose.

In the various forms of passive hæmorrhagy, in many other diseases of chronic debility, dyspepsia, hypochondriasis, paralysis, rickets, scrofula, dropsy, and in a variety of spasmodic affections, neuralgia faciei, epilepsy, chorea and hysteria, cinchona is administered as a powerful and permanent tonic, either alone, or combined with other remedies suited to the particular case. The more common combinations of it are with sulphuric acid as an astringent, with preparations of iron as a tonic, with mercury in syphilis, in spasmodic diseases with valerian, and with hemlock in scrofula and extensive ulceration.

Its usual dose is half a drachm. The only inconvenience of a larger dose is its sitting uneasy on the stomach. It may therefore, if necessary, be frequently repeated, and in urgent cases may be taken to the extent of an ounce or even two ounces in twenty-four hours, though from such large doses probably no adequate advan-

tage is derived. If it excite nausea, smaller doses may be taken and repeated more frequently, and may be reconciled to the stomach by the addition of any grateful aromatic.

The powder is more effectual than any of the preparations; it is given in wine, or in any spiritous liquor diluted with water, sometimes in milk, especially in buttermilk, or diffused in water by the medium of syrup or extract of liquorice. For particular purposes different preparations are employed. The cold infusion is the least powerful, but is grateful and sits easy on the stomach: it is however so weak, that it is scarcely used but as a bitter in dyspepsia. Prepared by previous trituration of the bark with a little magnesia, it is rather more active. The decoction contains more of the active matter of the bark, and is the preparation generally used when the powder is rejected; its dose is from two to four ounces; but it cannot be relied on for any important effect. The spiritous tincture, though containing more of the active principles, cannot be extensively used on account of the menstruum, but is employed occasionally in small doses of two or three drachms as a stomachic. Bark is sometimes given in the form of enema; a scruple of the extract, or two drachms of the powder, being diffused in four ounces of starch mucilage. The decoction is sometimes applied as a fomentation to ill-conditioned ulcers, or the powder is sprinkled on the ulcerated surface.

These are the forms in which bark has usually been administered; but since the discovery of its active principles, the salts of these in a pure form are frequently substituted for it, and if they could be always procured unadulterated, would probably supersede it altogether. The powder of bark, its most efficient form, loads the stomach and bowels with a quantity of ligneous fibre and other inert matter, which often cause such a degree of nausea and uneasiness as to render unavailing the virtues of its active principles. But when these principles are freed from extraneous matter, and given in combination only with acids which increase their activity, we have the medicinal powers of bark in the most perfect form. Sulphate of cinchonia has been employed, but being more expensive, and less efficacious than sulphate of quinia, the latter has come into universal use, and is proved, by extensive experience in this country, on the continent, and in the East and West Indies, to be a remedy of the greatest value; indeed, in tonic and febrifuge virtues it far surpasses any medicine that we possess. A formula has been given in the last edition of the Dublin Pharmacopœia for its preparation, which is afterwards to be considered.

Sulphate of quinia consists of eight parts of quinia, one part of sulphuric acid, and one part of water; eight grains of it are equivalent to an ounce of bark. It may be employed to answer every indication for which bark is used. It has been found also of the greatest service in acute rheumatism. Dr. Montgomery states, that he found it to act almost as a specific in the cure of infantile erysipelas. Its power of bringing the system more rapidly under the influence of mercury has been already taken notice of. The dose of sulphate of quinia is from one to five grains. For intermittents it is

usual to give three or four grains every four hours, during the intervals between the fits. On account of its intensely bitter taste, it is best given in the form of pill made up with bread and mucilage, or made into a bolus with sugar. It is also given in solution, a few drops of sulphuric acid being added to increase its solubility. Even when given in the solid form, it is advisable to give, after each dose, a few drops of an acid, such as the "aromatic sulphuric acid," which renders it more soluble and more active.

*Offic. Prep.*—Decoct. cinch. Extr. cinch. Extr. cinch. res. Inf. cinch. Tinct. cinch. Tinct. cinch. ammon. Quininæ sulph.

ARISTOLOCHIA SERPENTARIA. Virginian Snake-root. *Gynand. Hexand. Sarmentosæ*, Linn. *Aristolochiæ*, Juss. *Radix. Virginia, Carolina.*

THIS root consists of a number of small fibres, issuing from one stem, of a greyish-brown colour; it has a slightly aromatic smell, and a warm bitterish taste. Its active matter seems to be analogous to the bitter principle *quassine*. It contains also a small quantity of an essential oil, somewhat fragrant, but not pungent.

Serpentaria is an aromatic tonic, which used to be employed in fevers of the typhoid type, to support the powers of the system. It was given in a dose of from 10 to 20 grains every fourth or fifth hour; with this intention, it is now very rarely prescribed; and in any power it has of obviating debility or febrile action, it is probably considerably inferior to cinchona. It is sometimes combined with cinchona in the treatment of intermittent fever, and it occasionally enters as an ingredient into the composition of bitter infusions and tinctures used in dyspepsia.*

*Offic. Prep.*—T. arist. serpent.

DORSTENIA CONTRAYERVA. Contrayerva. *Tetrand. Monog. Scabridæ*, Linn. *Urticeæ*, Juss. *Radix. Peru, West Indies.*

THIS root is in twisted fibres of a yellowish colour; has an aromatic smell, and a bitterish taste; it yields its active matter to water and alcohol. Contrayerva, like serpentaria, was formerly used as a stimulant and diaphoretic in typhoid fevers, in a dose from 5 to 20 grains, but like it, too, it has fallen into disuse.

*Offic. Prep.*—P. contrayerv.

CROTON ELEUTHERIA. CROTON CASCARILLA. Cascarilla. *Monœc. Monad. Tricoccæ*, Linn. *Euphorbiaceæ*, Juss. *Bahama Islands, North America.*

CASCARILLA bark is in quills of a grey colour; has a slightly aromatic smell, and a warm bitter taste; it is highly inflammable, producing an agreeable fragrant odour when it is burnt. It consists, according to Tromsdorff, of mucilage and bitter principle, resin, volatile oil, water, woody fibre. It has been used as a substitute for Peruvian bark, and has been employed as a remedy in dysentery,

* *Incompatible Substances.* Acetate of lead.—B.

and in obstinate diarrhœa. Its usual dose is a scruple or half a drachm, but in modern practice it is little used.

*Offic. Prep.*—Tinct. casc. Inf. casc.

BONPLANDIA TRIFOLIATA. CUSPARIA FEBRIFUGA. Angustura Bark. *Pentand. Monogyn. Rutaceæ*, Juss. *South America.*

THIS bark was imported some years ago from the Spanish West Indies, the botanical characters of the tree producing it being unknown. These have been lately determined by Humboldt, who at first gave to the tree the name of Cusparia febrifuga, afterwards of Bonplandia trifoliata. The bark is in flat pieces, externally grey and wrinkled, internally of a yellowish-brown colour, and smooth; it has little odour; its taste is bitter and slightly aromatic. A spurious angustura bark is sometimes met with of a poisonous nature; it is said to be the bark of the Brucea antidysenterica, and contains a narcotic alkaline principle, which has been named Brucia, analogous in its properties to Strychnia. It is not difficult to distinguish the true angustura from the spurious; the latter is much heavier, and in thicker and shorter pieces; its surface is of the colour of rust; internally it is almost black, and it has an intensely bitter taste. Angustura bark, triturated with lime or potash and water, gives a smell of ammonia. Its watery infusion gives no precipitate with gelatin, but becomes turbid with infusion of galls. It appears to contain an alkaline principle, the nature of which is not fully ascertained, but some have supposed it to be cinchonia or quinia.*

Angustura was originally introduced in the West Indies as a remedy in fevers, equal or even superior to Peruvian bark. In this country it has not been much employed as a substitute for Cinchona; and in the treatment of intermittent, it has in the trials that have been made of it failed. It has been used with advantage in obstinate diarrhœa, chronic dysentery, and in dyspepsia. It improves the appetite, removes flatus, and is not so liable to disagree with the stomach as cinchona. The dose of the powder is from 10 to 20 grains.†

*Offic. Prep.*—Tinct. Bonpland. Inf. cuspar.

SWIETENIA FEBRIFUGA. Swietenia. *Decand. Monogyn. Trihilatæ*, Linn. *Meliaceæ*, De Cand. *Cortex. East Indies.*

THE bark of the wood of this tree is of a red colour internally; externally it is covered with a grey epidermis; it has an astringent bitter taste; it yields its active matter to water by infusion or decoction, and by evaporation affords an extract highly astringent. It was introduced as a substitute for Peruvian bark, and in India has been used with advantage in the treatment of intermittent and remittent fevers. Its dose in substance is half a drachm. The Swietenia mahogani or mahogany affords a bark having similar properties.

* Dr. Thomson considers it to be cinchonia combined with the Igausuric acid. —B.

† *Incompatible Substances.* Corrosive sublimate, sulphates of copper, iron and zinc, nitrate of silver, acetate of lead, nitric acid, astringent vegetable infusions.—B.

**Salix alba.** White Willow. *Diœcia. Diand. Amentaceæ,* Linn. Juss. *Salicineæ,* Rich. *Cortex. Indigenous.*

The bark of the white willow has of late acquired some celebrity as a substitute for cinchona. It is thin, fibrous, and covered with a brown epidermis. An alkaline principle is said to exist in it, having some analogy to quinia, which has been named Salicine.* Willow bark also contains a portion of tannin. It has been found serviceable in intermittents, and in cases of ulceration. Of the powder the dose is the same as that of cinchona. The decoction, prepared by boiling an ounce and a half of the bark in two pounds of water, is given in doses of an ounce or two three or four times a-day.†

The bark of the salix fragilis, and the salix caprea, is used in the same manner.

**Cocculus palmatus.** Colomba. *Diœcia Dodecand. Menispermeæ,* Juss. *Radix. Africa.*

The plant which furnishes Colomba is the Menispermum cocculus of Roxburgh, or Cocculus palmatus of De Candolle. It grows wild in the south-eastern part of Africa, and the root is exported from Mozambique. Colomba is in round thin pieces, evidently formed by transverse sections of the root; the circumference of these is covered with a bark; the woody part is of a light yellow colour, spongy, and often worm-eaten. It has a faint aromatic smell, and a bitter taste. It yields its bitterness to water, and has been supposed to contain a portion of cinchonia.‡ Dr. Duncan was of opinion that its active principle is more allied to picrotoxia. A spurious colomba is brought from North America, which, according to professor Bigelow, is the root of the Frasera Walteri, a plant of the natural order of the gentianæ; the tincture from it forms a green precipitate with salts of iron, whereas the tincture of the genuine colomba is not affected by iron.

Colomba is a powerful antiseptic and bitter; and its bitterness is free from all nauseous flavour; it is used with much advantage in affections of the stomach and intestinal canal, accompanied with redundance of bile; it is also employed in dyspepsia, and forms a more powerful and grateful stomachic than the common bitters. Its dose is half a drachm of the powder, which, in cases of cholera or bilious remitting fever, may be repeated every third or fourth hour. When used in dyspepsia, it may be given under the form of infusion, or sometimes the root is chewed.§

* Although enjoying considerable celebrity, salacine is not to be compared with quinia as a tonic. In some cases of intermittent fever, in which I tried it recently at the New-York Hospital, although given in very liberal doses, and continued for a considerable length of time, it failed completely to arrest the disease. The same cases were afterwards very promptly cured by the sulphate of quinia.—B.

† *Incompatible Substances.* Solution of isinglass, lime water, carbonates of potash and ammonia, sulphate of iron.—B.

‡ The presence of cinchonia in the colomba has been disproved by the examination of M. Planché and M. Guibourt. Recently a new principle, called *columbine,* has been obtained from the root by digesting in ether, then filtering and evaporating. Its properties have not yet been fully investigated.—B.

§ *Incompatible Substances.* Acetate of lead, corrosive sublimate, lime water, infusion of gall nuts, and yellow Peruvian bark.—B.

*Offic. Prep.*—Tinct. colomb. Inf. colomb.

QUASSIA SIMAROUBA. Simarouba. *Decand. Monogyn. Gruinales,* Linn. *Rutaceæ,* Juss. *Cortex. South America.*

THE bark of the root of this tree, which is the part medicinally employed, is in long pieces, of a fibrous texture and yellowish colour; destitute of odour, and having a strong bitter taste. It is however variable in its sensible qualities, some specimens having scarcely any bitterness. Water and alcohol dissolve its active matter, which has been said to constitute a peculiar vegetable principle, and has received the name of Quassine; the solution in either menstruum suffers no change from sulphate of iron.

Simarouba has been celebrated as a remedy in intermittent fever, dysentery, and chronic diarrhœa, and has been given generally in the form of decoction: in substance the dose is one scruple. Though used in the countries in which it is a native, it is with us rarely prescribed.

*Offic. Prep.*—Infus. simaroub.

QUASSIA EXCELSA. Quassia. *Decand. Monog. Gruinales,* Linn. *Rutaceæ,* Juss. *Lignum. West Indies.*

THE wood of the root of this tree is of a yellowish-white colour; it has a taste intensely bitter, without any odour or aromatic flavour. The bitterness is extracted equally by water and by alcohol, and depends on the same principle which exists in Quassia Simarouba.

It is a valuable bitter, used in dyspepsia, diarrhœa, and in remittent and intermittent fevers, and is also sometimes employed to check vomiting. Brewers often use it to give bitterness to malt liquors, a practice, however, forbidden by the laws.

*Offic. Prep.*—Infus. quass. Tinct. quass.

GENTIANA LUTEA. Gentian. *Pentand. Digyn. Rotaceæ,* Linn. *Gentianæ,* Juss. *Radix. Switzerland, Germany.*

THIS root is in long slender pieces, soft and flexible, of a yellowish colour, with a greyish epidermis. It has a very bitter taste, without any peculiar flavour. This bitterness is extracted both by water and alcohol, and depends on a peculiar vegetable principle, which has received the name of Gentianine.* The liquor obtained by decoction with water affords, by inspissation, an extract intensely bitter.

From the experiments of MM. Henry, and Caventou, it appears to consist of gentianine, fixed oil, sugar, gum, woody fibre, and a free acid.

Gentian is a common remedy in dyspepsia, in the form of infusion or tincture; as a bitter, it is more frequently used perhaps than any other, and usually forms the basis of stomachic remedies. In substance it has been given, for the cure of intermittents, in a dose of half a drachm. Its powder is sprinkled on malignant ulcers.†

* The *Gentianine* is an excellent tonic to the stomach, and may be used with great advantage in many cases of dyspepsia attended with gastric irritability. The best form of giving it is that of pill, in doses of one grain, repeated two or three times a-day.—B.

† *Incompatible Substances.* Acetate of lead and decoction of yellow cinchona.—B.

*Offic. Prep.*—Extr. gent. Inf. gent. Tinct. gent. Vin. gent.*

ANTHEMIS NOBILIS. Chamæmelum. Chamomile. *Syngenes. Polygam. superfl. Compositæ Corymbiferæ*, Juss. *Flores. Indigenous.*

THE flower of this herb is collected before it is fully expanded, and dried. There are two varieties of it obtained by cultivation, the single and double flowered: the former is much stronger than the latter, the odour and taste residing not in the white petals, but in the disk or tubular florets, which are larger in the single flowers. They have a bitter nauseous taste, and a strong unpleasant odour. The bitterness, with part of the odour, is extracted by water and alcohol, and if the infusion has been made with warm water, it is nauseous, probably from the extraction of a portion of the essential oil. This oil, strongly odorous, is afforded in a small quantity by distillation with water.†

Chamomile is a powerful bitter, and as such is useful in dyspepsia, primary or symptomatic, and forms a popular remedy which is in common use. It is equal perhaps to any of the vegetable bitters, and has even a superiority in the facility with which its bitterness is extracted by water. The cold infusion is most grateful, and hence it ought to be used under this form. The infusion in tepid water, when strong, acts as an emetic, and is often used to promote the action of other emetics. In substance it has been given as a remedy in intermittent fever, in a dose of half a drachm three or four times a-day. Externally, the flowers steeped in water are employed as a fomentation. The extract, which is intensely bitter, free from any nauseous flavour, affords a convenient bitter in the form of a pill; it is also a convenient vehicle for forming pills, especially when it coincides in virtue with the substance prescribed under that form.

*Offic. Prep.*—Extr. anth. Inf. anth. Decoct. anth. Ol. anthem.

The following plants, possessing bitterness in a greater or less degree, were formerly employed, but are now discarded from practice. They possess no virtues but those of bitters, and as they have all more or less of a nauseous flavour, gentian, colomba, or quassia, is preferred to them. It is necessary to notice only their botanical characters.

ARTEMISIA ABSINTHIUM. Wormwood. *Syngenes. Polygam. superfl. Compositæ Corymbiferæ*, Juss. *Herba. Indigenous.*

CHIRONIA CENTAURIUM. ERYTHRÆA CENTAUREUM. Centaury. *Pentand. Monogyn. Rotaceæ*, Linn. *Gentianæ*, Juss. *Herba.*

* In the United States there are found growing a number of different species of gentian. In their medicinal properties they are similar to the foreign, and may be used in the same way. A very full account of them may be seen in Rafinesque's Medical Flora. Vol. vi. p. 206.

† Recent researches have rendered it probable that the chamomile contains *piperina*, and that to this is owing its efficacy as a tonic.—B.

MARRUBIUM VULGARE. Horehound. *Didynam. Gymnosp. Verticillatæ*, Linn. *Labiatæ*, Juss. *Herba.*

MENYANTHES TRIFOLIATA. Buck-Bean. Marsh Trefoil. *Pentand. Monog. Rotaceæ*, Linn. *Gentianæ*, Juss. *Herba.*

CENTAUREA BENEDICTA. CNICUS BENEDICTUS. Blessed Thistle. *Syngenes. Polygam. frustran. Compositæ Corymbiferæ*, Juss. *Herba. Spain.*

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The remaining substances belonging to this class are those in which the aromatic quality predominates, blended in some of them with a degree of bitterness. They are much inferior in tonic power, and a number of them are employed only as grateful stimulants to the stomach.

CITRUS-AURANTIUM. Orange. *Polyadelph. Icosand. Pomaceæ*, Linn. *Aurantiaceæ*, Juss. *Cortex flavus, Fructus ; Fructus Immaturus.*

THE Orange-tree is a native of India, but is abundantly cultivated in the south of Europe. The outer rind of the fruit, especially of that variety named the Seville or Bitter Orange, has a grateful aromatic flavour, and a warm bitterish taste, both of which depend on an essential oil, which, existing in the rind in distinct vesicles, may in part be obtained by expression, but more abundantly by distillation. The rind is dried for use ; both taste and flavour are extracted by water by infusion, as well as by alcohol. Its qualities are those of an aromatic and bitter. It has been employed to restore the tone of the stomach ; and is a very common addition to combinations of bitters used in dyspepsia, communicating to them its grateful odour, and coinciding with them in power. It has likewise been given in intermittents in a dose of a drachm twice or thrice a-day. The leaves and flowers of the Orange-tree are inserted in the Dublin Pharmacopœia. They have been supposed to be useful in epilepsy, but appear to have no medicinal power.

*Offic. Prep.*—Cons. citri aur. Syr. cit. aur. Aqua cit. aur. Inf. cit. aur.

THE unripe fruit of the same variety, Curasso Oranges as they are named, retain when dried the aromatic flavour of the peel, with rather a larger share of bitterness, and are applied to the same uses.

The juice of the ripe fruit of the variety named the China Orange, consists principally of citric acid and saccharine matter, and so far as it has any medicinal virtue, is a refrigerant, and is to be afterwards considered.

CITRUS MEDICA. Lemon. *Polyadelph. Icosand. Pomac.* Linn. *Aurantiaceæ*, Juss. *Cortex fructus, et corticis oleum essentiale.*

THE Lemon-tree, though a native of the warmer countries of Asia, has been long cultivated in the south of Europe. The ex-

terior rind of the fruit contains an essential oil in distinct cells, whence it derives its aromatic quality. The dried rind is similar in flavour and taste to that of the orange, but is rather less bitter and aromatic ; its flavour, too, is more perishable, and from both circumstances it is less frequently used, though it may be employed for similar purposes. The oil is in use as a perfume. The juice is strongly acid, consisting chiefly of citric acid ; its medicinal applications fall to be considered under the class of refrigerants.

*Offic. Prep.*—Aqua citri medicæ. Syr. citr. med. Acid. citric.

Acorus calamus. Sweet-scented Flag. *Hexand. Monog. Piperitæ*, Linn. *Aroideæ*, Juss. *Radix.*

This plant grows in marshy situations in this and other countries of Europe. Its root, dried and covered with the bark, is kept in the shops. It is soft, flat, and jointed ; has a faint, aromatic smell, and a warm bitterish taste. It consists of gum, resin, inuline, and an essential oil, in which its flavour resides. It is scarcely ever used.

Laurus cinnamomum. Cinnamon. *Enneand. Monogyn. Oleraceæ*, Linn. *Laurineæ*, Juss. *Cortex et oleum volatile. Ceylon.*

This tree, a native of Ceylon, is now cultivated in India. The cinnamon is the interior bark of the branches of the tree ; it is thin and convoluted, of a texture somewhat fibrous, friable, of a light brown colour, having an agreeable pungent taste, with a degree of sweetness, and a grateful aromatic flavour. Its virtues chiefly depend on a small quantity of essential oil which it contains, and which, obtained by distillation, is highly odorous and pungent. It yields its aromatic flavour and taste both to water by infusion, and to alcohol ; and water distilled from it has also its pungency.

Cinnamon is one of the most grateful of the aromatics. It is used to cover the unpleasant taste and flavour of other medicines, and to reconcile them to the stomach. It is also employed by itself as a moderate stimulant and cordial, given under the form of the watery infusion or distilled water. The former is more grateful, and is often successful in relieving nausea and checking vomiting.

*Offic. Prep.*—Aq. cinn. Spirit. cinn. Tinct. cinn. Pulv. cinn.

Laurus cassia. Cassia. *Enneand. Monog. Laurineæ. Cortex. Flores nondum expliciti. India.*

The Cassia-tree has been regarded as a variety of the cinnamon, but appears to be a distinct species. Its bark resembles that of cinnamon in appearance, taste and flavour ; it is distinguished by its taste being more pungent, less sweet, and more mucilaginous, than that of the real cinnamon ; by its texture being denser, so that it breaks close and smooth ; and by the pieces of it being thicker and less convoluted. Its aromatic quality, like that of cinnamon, resides in an essential oil. It affords a distilled water, stronger than that of cinnamon, and yields also its taste and flavour to water by infusion. It is used for the same purposes as cinnamon ; it is, however, much less agreeable to the stomach, and rather more pungent and stimulating. It cannot, therefore, be always with propriety substituted

for the other, especially where the stomach is in an irritable state. The cassia buds are collected before they are fully expanded, and are dried; they are of a dark grey colour, are similar in taste and flavour to the bark, and are often substituted for it in officinal preparations.

*Offic. Prep.*—Aqua l. cass.

CANELLA ALBA. *Dodecand. Monogyn. Oleraceæ,* Linn. *Meliaceæ,* De Cand. *Cortex. West Indies.*

THIS is the inner bark of the branches of the tree. It is in quills, or flat pieces, of a light yellowish-grey colour; its flavour is somewhat aromatic, and its taste is pungent. By distillation it affords a thick essential oil. Alcohol extracts its aromatic quality; water does so imperfectly.

Canella is employed principally on account of its aromatic quality, and generally in combination with other remedies, to render them more grateful. It thus enters into the composition of several officinal tinctures, and has been supposed, in particular, well adapted to cover the flavour of aloes.

*Offic. Prep.*—Vin. aloes cum can. Pulv. al. cum can.

WINTERA AROMATICA. DRYMIS AROMATICA. Winter's Bark. *Polyand. Tetrag. Oleraceæ,* Linn. *Magnoliaceæ,* Juss. *Cortex. Brazil.*

THIS plant is named from Captain Winter, who discovered it on the coast of Magellan. The bark is intermediate in properties between cinnamon and canella alba; it is less bitter and more pungent than the latter, from which it differs chiefly in containing a small proportion of tannin. It has been found serviceable in scurvy.

MYRISTICA MOSCHATA. *Diœcia. Monadelphia. Laurineæ,* Juss. *Myristiceæ,* Brown. *Fructus nucleus. Nux Moschata dictus; Macis; Hujus Oleum.*

UNDER the officinal name Myristica, are comprehended Nux Moschata or Nutmeg, and Macis or Mace; the former being the seed or kernel of the fruit, the latter the covering with which it is immediately surrounded. The tree is a native of the Molucca islands. The external covering and pulp of the fruit are removed, and the nutmeg and mace are dried by exposure to the sun.

Nutmegs are round, of a greyish colour, streaked with brown lines, slightly unctuous; they have a strong aromatic flavour, and a pungent taste. They yield their active matter entirely to alcohol: distilled with water, they afford a fragrant and pungent essential oil; by expression, a sebaceous oil is obtained from them, retaining their fragrant odour, and part of their pungency, probably from part of the essential oil being expressed along with it.

Nutmeg is used in medicine as a grateful aromatic. It may be given in a dose from 5 to 15 grains, and is sometimes employed to relieve nausea or vomiting, or to check diarrhœa, taken generally in wine. It has been said to prove narcotic in a large dose. It is also frequently employed to conceal the taste and flavour of unpleasant medicines, and to obviate the nausea they might excite.

Mace is a membranous substance, unctuous, of a yellow colour, and having a flavour and taste similar to nutmeg, but rather less strong. It is used for the same purposes.

The expressed oil of nutmeg, generally known by the name of Oil of Mace, is sometimes used as an external stimulating application, but in the shops is seldom genuine.

*Offic. Prep.*—Sp. myrist. mosch.

Eugenia caryophyllata. Caryophyllus aromaticus. Clove. *Icosand. Monog. Hesperideæ,* Linn. *Myrtaceæ,* Juss. *Flores nondum expliciti et oleum volatile.*

The tree producing cloves is a native of the Molucca islands, but is cultivated in other parts of India. The cloves are the flower buds, which are dried by exposing them first to the smoke of fuel, and afterwards to the sun. They are of a greyish-brown colour, slightly unctuous on the surface; have a strong aromatic odour, and a warm pungent taste. They afford to water their flavour principally. By distillation with water, they yield a fragrant essential oil, not very pungent.

Cloves are among the most stimulating of the aromatics. They are employed principally as adjuvants or corrigents to other medicines, particularly in combination with bitters, or with the vegetable cathartics. The essential oil is used with the same intention, and as a local application to severe toothach. The infusion in tepid water has been employed as a grateful stimulant to relieve the sense of coldness in the stomach, which attends some forms of dyspepsia.

*Offic. Prep.*—Inf. caryoph.

Capsicum annuum. Capsicum or Guinea Pepper. *Pentand. Monog. Solanaceæ,* Linn. *Solaneæ,* Juss. *Fructus. East and West Indies.*

The fruit of this plant is an oblong pod, of an orange colour, containing a pulp inclosing seeds. The membranous pod has an odour aromatic and penetrating, but which is impaired by drying; its taste is extremely hot and acrid, the sensation which it excites remaining long impressed on the palate. Its pungency is completely extracted by alcohol.

Capsicum is a powerful stimulant. As such it has been given in atonic gout, in palsy and dyspepsia, in tympanitis and dropsy, and in the latter stage of fever, where the powers of life are nearly exhausted. It is given in the dose of 5 or 10 grains, in the form of pill. In chronic affections it is combined with preparations of iron or other tonics. Cayenne pepper, which is a mixture of the powder of several species of capsicum, is used as a condiment to food, especially in warm climates, and proves useful by obviating flatulence and promoting digestion. An infusion of capsicum in diluted vinegar, with the addition of salt, has been used as a gargle in cynanche maligna. The capsicum pod is sometimes employed as an ingredient in rubefacient cataplasms, applied to the soles of the feet to relieve the coma of fever. The seeds have been found useful in ob-

stinate intermittents, two grains being given at the approach of the cold paroxysm.*

*Offic. Prep.*—Tinct. capsici.

PIPER NIGRUM. Black Pepper. *Diand. Trigyn. Piperitæ. Fruct.*

BLACK or Common Culinary Pepper is the unripe fruit of this plant dried in the sun. Its smell is aromatic; its taste pungent. The taste and smell are owing to an acrid essential oil; besides it, there exists in pepper a principle, Piperin, which has no pungency, is crystallizable, insoluble in water, but soluble in alcohol and acids. Piperin has been recommended of late as a febrifuge, and said to be equally efficacious with sulphate of quinia in the cure of intermittents.†

Pepper, from its stimulating and aromatic quality, is employed as a condiment to promote digestion: as a medicine it is given to relieve nausea, or check vomiting, to remove singultus, and as a stimulant in retrocedent gout and paralysis. Its dose is ten to fifteen grains. Its infusion has been used as a gargle in relaxation of the uvula. The confection relieves piles.

White Pepper is the ripe berries of the same plant, freed from the outer covering, and dried in the sun. It is less pungent than the black.

*Offic. Prep.*—Conf. pip. nig. Unguent. pip. nig.

PIPER LONGUM. Long Pepper.

THIS is the berry of another species of pepper, gathered before it is fully ripened, and dried in the sun. It is oblong, indented on the surface, of a dark grey colour. In flavour, taste, and other qualities it is similar to the black pepper.

PIPER CUBEBA. Cubebs, or Java Pepper. *Diand. Trigyn. Piperitæ. Fructus.*

THIS tree is a native of Java and other parts of the East Indies. The berries grow in clusters, and are about the size of black pepper corns; a peduncle remains always attached to them, whence the name of Piper caudatum also given to them. When dried they are of a brown colour, with a wrinkled surface; they have an aromatic odour, and a moderately warm taste. According to the analysis of Vauquelin, the chief principles they contain are a volatile oil, and a resin resembling balsam of copaiba.

Cubebs pepper had almost fallen into disuse in medicine, but it has of late been found to be a very powerful remedy in the cure of gonorrhœa; it has hence been introduced into the Dublin Pharmacopœia, and will probably be replaced in the Pharmacopias of the other colleges from which it had been expunged. It is given in a

* *Incompatible Substances.* The infusions of capsicum are disturbed by infusions of galls, nitrate of silver, oxymuriate of mercury, acetate of lead, the sulphates of iron, copper, and zinc; ammonia, carbonate of potash and alum, but not by sulphuric, nitric, or muriatic acid.—B.

† The best form of taking the piperin is that of pill, in about the same dose as the sulphate of quinia.—B.

dose of one or two drachms of the powder twice or thrice a-day, and should be continued for a day or two after the discharge has ceased; its efficacy has been established by ample experience.* It appears to act, as Sir Astley Cooper expresses it, by "producing a specific inflammation of its own on the urethra, which has the effect of superseding the gonorrhœal inflammation." It may be conjoined with advantage with balsam of copaiba. Cubebs has been found useful also in leucorrhœa. A tincture is introduced into the Dublin Pharmacopœia, which Dr. Montgomery prefers to the powder; the dose of the tincture is one or two drachms thrice a-day.

*Offic. Prep.*—Tinct. pip. cub.

Myrtus pimenta. Jamaica Pepper, or All-spice. *Icosand. Monog. Hesperidæ*, Linn. *Myrtaceæ*, Juss. *Baccæ. West Indies.*

The berries of this tree are collected before they are ripe, and are dried in the sun. Their taste, though pungent, is less so than that of the peppers; their flavour is fragrant, and has been compared to that of a mixture of cloves, nutmeg, and cinnamon, whence the name of All-spice. The flavour resides in an essential oil; the pungency in a resin. Pimento is used in medicine as an aromatic, and principally on account of its flavour.

*Offic. Prep.*—Aq. pim. Sp. pim.

Amomum zingiber. Zingiber Officinale. Ginger. *Monand. Monog. Cannæ*, Juss. *Radix. India.*

This plant has been placed under the genus Amomum, but the London College have admitted the alteration proposed by Mr. Roscoe, and inserted it as the species of a different genus, under the name Zingiber Officinale. It is a native of India, but is now abundant in the West Indies, whence the dried root is imported. It is in wrinkled pieces, of a greyish or white colour, having an aromatic odour, and a pungent, somewhat acrid, taste. The Black Ginger is the root prepared with less care than the White; the latter, previous to drying, being scraped and washed.

Ginger yields its aromatic matter to alcohol, and in a great measure to water. By distillation it affords a small quantity of essential oil, which is fragrant, but not pungent, the pungency residing in a resino-extractive principle.

This root is employed as a grateful and moderately strong aromatic, in combination with other remedies, to promote their efficacy, or obviate symptoms arising from their operation, or by itself as a sti-

* With regard to the use of this article in gonorrhœa, I cannot say from my own experience, that I consider it in any respect superior to the Balsam Copaiva. I have used it in several cases and to a very great extent, and although in every case it sensibly diminished the discharge, yet in very few did it effect a permanent cure. In some instances, after administering the cubebs unsuccessfully, the disease has yielded very readily to the copaiva. By Dr. Trail of Liverpool, cubebs has been used with success in leucorrhœa. Dr. Paris states that the "Turkey yellow berries," the dried fruit of the Rhamnus Catharticus, are frequently substituted for cubebs, and that the resemblance between them is so great, as to render an imposition very easy. This is a fact which deserves to be generally known, and may perhaps account in part for the uncertainty which has hitherto been observed in the operation of the cubebs.—B.

mulant. With the latter intention it is used in dyspepsia, flatulence, and tympanitis, in the form of powder. Its dose may be ten grains. It is given in large doses in gout. Chewed, it excites the salivary discharge.

*Offic. Prep.*—Syrup. zingib. Tinct. zingib.

Amomum repens. Amomum Cardamomum. Cardamomum minus. Lesser Cardamom. *Monand. Monogyn. Cannæ*, Juss. *Semina. India.*

Two species have been described as affording the lesser cardamom seeds, the Amomum Repens, and Amomum Cardamomum. The former appears to be the true species.

The seeds are dried and imported in their capsules, by which their flavour is better preserved. Their smell is aromatic, their taste pungent, and both are communicated by infusion to water, as well as to alcohol. They afford by distillation an essential oil. They are used as grateful aromatics, and are frequently combined with bitters or with purgatives, to obviate flatulence.

*Offic. Prep.*—Tinct. card. Tinct. card. comp.

Carum carui. Caraway. *Pentand. Digyn. Umbellatæ*, Linn. *Umbelliferæ*, Juss. *Semina.*

Caraway, though an indigenous plant, is usually cultivated for its seeds. They have an aromatic flavour, and a warm taste, depending principally on an essential oil, which they contain in considerable quantity. They are used to relieve flatulence, one or two drachms being swallowed entire; their essential oil, which has considerable pungency, and is grateful, is not unfrequently added to other medicines, to obviate nausea or griping.

*Offic. Prep.*—Sp. car. Aq. car. Ol. car.

Coriandrum sativum. Coriander. *Pentand. Digyn. Umbellatæ*, Linn. *Umbelliferæ*, Juss. *South of Europe.*

This plant is cultivated in our gardens for its seeds. They have a more pleasant odour when dried than when fresh: their taste is moderately warm. Their taste and flavour depend on an essential oil. Like caraway, they are used as carminative, and likewise to cover the taste and flavour of some medicines, particularly of senna, when given under the form of infusion or tincture.

Pimpinella anisum. Anise. *Pentand. Digyn. Umbellatæ*, Linn. *Umbelliferæ*, Juss. *Semina. Egypt.*

This plant is cultivated in the south of Europe, and sometimes also in our gardens. Its seeds have an aromatic odour, and a warm taste, with a share of sweetness. They are used chiefly as a carminative in dyspepsia, and in the flatulence to which infants are subject. A small quantity of the seeds may be taken, or, what is preferable, a powder composed of a few drops of the oil rubbed with sugar.

*Offic. Prep.*—Ol. anisi. Sp. anis.

The seeds of the following plants have qualities so similar to those

of anise or caraway, that they do not require distinct consideration. They are used for similar purposes, but are scarcely entitled to a place in the Materia Medica.

Anethum fœniculum. Sweet Fennel. *Pentand. Digyn. Umbellatæ*, Linn. *Umbelliferæ*, Juss. *Semina, Indigenous.*

Anethum graveolens. Dil. *Pentand. Digyn. Umbellatæ*, Linn. *Umbelliferæ*, Juss. *Semina. Spain and Portugal.*

Cuminum cyminum. Cumin. *Pentand. Digyn. Umbellatæ*, Linn. *Umbelliferæ*, Juss. *Semina. South of Europe.*

Angelica archangelica. Angelica Sativa. Garden Angelica. *Pentand. Digyn. Umbellatæ*, Linn. *Umbelliferæ*, Juss. *Folia, Radix. North of Europe.*

Of this plant, the root possesses the greatest share of aromatic quality, though it also belongs to the seeds and leaves.

Mentha piperita. Peppermint. *Didynam. Gymnosp. Verticillatæ*, Linn. *Labiatæ*, Juss. *Herba. Indigenous.*

Of the different mints, this is the one which has the greatest degree of pungency. The leaves have a considerable degree of aromatic odour and taste; the taste being pungent, followed by a sensation of coolness on the tongue. They afford an essential oil, rich in the aromatic quality and pungency of the herb. Peppermint is used as a stimulant and carminative, to obviate nausea or griping, or to relieve the symptoms arising from flatulence, and very frequently to cover the taste and odour of other medicines.

*Offic. Prep.*—Aq. menth. pip. Ol. menth. pip. Sp. menth. pip.

Mentha viridis. Spearmint.

Mentha pulegium. Pennyroyal.

These two mints, spearmint and pennyroyal, resemble the peppermint in their qualities, and are used for the same purposes, but are less agreeable and pungent. Their essential oil and distilled water are inserted in the Pharmacopœia.

Hyssopus officinalis. Hyssop. *Didynam. Gymnosp. Verticillatæ*, Linn. *Labiatæ*, Juss. *Herba. Asia, South and East of Europe.*

This plant, which grows in our gardens, nearly allied to the preceding in botanical characters, is possessed of very similar qualities, and is sometimes employed for the purposes for which they are used. It has also been considered as a remedy in catarrh, but it can have no efficacy.

[Eupatorium perfoliatum. Bone-set. Thorough-wort. *Syngenesia Polygamia Equalis.* Nat. Ord. Lin. *Compositæ discoideæ. Herba et flores. America.*

This is a plant indigenous to our country, and has acquired very great and deserved celebrity as a remedy in various diseases. It is to be met with in every part of the United States, and flourishes in the vicinity of low and marshy situations. It is known by a variety of popular appellations, such as thorough-wort, thorough-wax, cross-wort, Indian sage, vegetable antimony, bone-set, &c. &c. In the neighbourhood of this city it flowers in the month of July. The whole plant is intensely bitter, and slightly astringent. According to the analysis of Dr. Andrew Anderson of this city, it contains free acid, tannin, extractive matter, gummy matter, resin, azote, lime, gallic acid, and a resiniform matter, soluble in water and in alcohol, and which seems to contain a bitter principle.* The active properties of Bone-set are yielded both to alcohol and water. With regard to the medicinal virtues of this plant there has existed a great diversity of sentiment. If all that has been written on this subject could be credited, we should have to admit it to be one of the most extraordinary articles in the Materia Medica, for there is scarcely an indication to be encountered in the management of the diversified forms of disease which it has not been represented as equally capable of fulfilling. It has, accordingly, at different times and by different persons, been considered as a tonic, cathartic, emetic, diaphoretic, deobstruent, &c. &c. It is well known that the effects of a medicine are entirely different according to the dose and form in which it is given, and the peculiar circumstances of the patient at the time. If this fact be kept in view, there will be little difficulty in accounting for the great variety of virtues ascribed to the Bone-set, without calling in question the candour or veracity of the writers just alluded to. If given in substance or cold infusion, and in moderate doses, the bone-set exhibits all the properties of a vegetable tonic ; while on the other hand, if taken warm and in large doses, it proves emetic, cathartic, diaphoretic, &c. There can be no question, however, that the efficacy of this plant is to be ascribed chiefly to its *tonic* and *diaphoretic powers*, and it is with this view that it has been principally used in the treatment of diseases. A very large number of practitioners have given their testimony in favour of this article in intermittent and remittent fevers. Dr. Anderson states that it was extensively used in the New-York Alms House in 1812, in the treatment of these diseases, and that it proved generally successful. In yellow fever the virtues of the Eupatorium have been much commended by Drs. Bard and Hosack. It seems to have been used by these gentlemen chiefly as a diaphoretic. In the typhoid peripneumony, which prevailed so extensively in our country a few years since, the bone-set is stated to have proved an admirable sudorific, after the system had been properly prepared by previous evacuations. In this way it was very commonly prescribed by our physicians. In catarrh it has also for a long time been a favourite remedy As a simple tonic it has been highly recommended in diseases of general debility. As an alterative it has also proved highly beneficial in diseases of the skin.

* Inaugural Dissertation. New-York, 1813.

The bone-set may be administered in powder, in decoction or infusion, and in tincture. When given as a tonic the dose of the powder is from 20 to 30 grains, and of the infusion from two to four ounces. When intended to act as a sudorific, the infusion must be given in larger quantities, and frequently repeated.—B.]

[CORNUS FLORIDA. Common Dogwood. New England Boxwood. *Tetrandria Monogynia.* Nat. Ord. *Stellatæ.* *Cortex.* *America.*

THE Dogwood is a forest tree found in every part of our country, although it flourishes in the greatest abundance in the states of New-Jersey, Pennsylvania, Maryland, and Virginia. It is slow in its growth, and the general height to which it attains is from fifteen to twenty feet, with a diameter of from four to six inches. It flowers in the months of May and June. The berries succeeding to the flowers ripen in September, and are oblong in shape, and of a rich crimson colour. The bark is the part used in medicine, and according to analysis contains tannin, gallic acid, resin, gum-resin, bitter extractive, and mucilage. Recent investigations have shewn it to contain a peculiar alkaline principle, called *cornia.* The medical properties of the dogwood are those of a powerful tonic. In its operation on the system it bears a great resemblance to the Peruvian bark, and is used with great success as a substitute for that article in the management of the intermitting forms of fever. In the advanced stages of typhoid fevers, it has also been used with advantage. In dyspepsia, loss of appetite, and general debility, it has proved probably quite as successful as any of the stomachics and tonics in ordinary use. A circumstance of considerable importance in relation to the operation of this article is, that if administered in its fresh state, the bark is apt to disturb the stomach and bowels. By keeping it for about a year previous to its use, this property will be completely corrected. The dogwood may be administered in substance, in doses of from ʒj to ʒij; in extract, in doses of from 5 to 15 grains, or in infusion or decoction. The *sulphate of cornia* has been used in intermittent fever in grain doses every hour, and with complete success.

There are two other species of the Cornus which are used in medicine, the *cornus circinata* and *cornus sericea.* In their general properties, they so nearly resemble the C. Florida, as to render unnecessary any particular account of them. The Circinata has been made the subject of minute examination by Dr. Ives of this city,* and he states it to resemble the cinchona cordifolia more than any other article, but that it differs from it in possessing more astringency and aroma. From its astringent properties it has been found very beneficial in debilitated conditions of the stomach and bowels. In chronic diarrhœa it is even recommended by some as surpassing in efficacy every other remedy. The doses in which it is to be administered are the same as those of the Cornus Florida.—B.]

* Medical Repository, Vol. XXII.

[PRUNUS VIRGINIANA. Wild Cherry tree. *Icosand. Monogyn. Cortex. America.*

THIS is a large and handsome tree, growing abundantly in different parts of the United States, where it is indigenous. The part used in medicine is the bark, and that of the root possesses the most activity. It has a bitter and astringent taste ; its smell is somewhat aromatic, and, when fresh, resembles that of peach kernels. This bark is supposed to contain *prussic acid,* and in considerable quantity. All its active properties are soluble in water. In its operation on the system this article is tonic and narcotic, this latter effect being doubtless owing to the prussic acid. The diseases in which it has been used with most advantage are, intermittent fever, dyspepsia, and phthisis pulmonalis. It may be given in powder, in doses of from ℈j to ʒj ; or in cold infusion, made by putting ℥ij of the bark on a quart of water, and letting it stand twenty-four hours ; of this from ℥ij to ℥iv may be taken three or four times a day.—B.]

[LIRIODENDRON TULIPIFERA. Tulip tree. American tulip-bearing poplar. *Polyandria Polygynia.* Nat. Ord. *Cordunatæ. Cortex. America.*

THIS is one of the most magnificent of our forest trees, distinguished alike by its great height, its beautiful foliage, and superb flowers. It grows in almost every part of the United States, and not unfrequently attains to the height of one hundred and thirty or forty feet. Its flowers are exceedingly beautiful, being variegated with yellow, orange, and green. The part used in medicine is the bark. This is of a whitish colour, and has a rough and fibrous appearance. Its taste is bitter and astringent. According to analysis it yields gum, resin, iron, muriatic acid, and mucus. Very recently, Prof. Emmet, of the University of Virginia, has ascertained in it a peculiar principle, which he calls *Liriodendrine.* This is neither acid nor alkaline, and its properties appear to place it with camphor as a connecting link between the resins and volatile oils. The effects of the tulip bark are those of a decided tonic, combined at the same time with those of a stimulant. If given in considerable quantities, it proves also diuretic and diaphoretic. The diseases in which it has been used with advantage are, intermittent fever, chronic rheumatism, hysteria, and gastric debility. Of the *Liriodendrine* no practical use has yet been made. The most efficacious form of using the tulip bark is in substance ; of this, in the form of powder, from ʒss to ʒij may be given at a dose.—B.]

# CHAP. V.

## OF ASTRINGENTS.

It has been supposed by medical theorists, that the fibres of the living body, over the whole, or part of the system, may become relaxed, or lose that density and contraction necessary for the due performance of the several functions; and this is considered as an affection of the matter of which the fibre is composed, not of the living or irritable principle connected with it. It has farther been imagined, that this relaxation may be removed by the application of those substances, which, when applied to dead animal matter, condense and constringe it. Such substances, classed as remedies, have been named Astringents. They are defined by Cullen: "Such substances as, applied to the human body, produce contraction and condensation in the soft solids, and thereby increase their density and cohesion." By the operation of this corrugating power, either directly exerted on a part, or extended by sympathetic action, the morbid affections arising from a state of relaxation are supposed to be removed.

The arguments adduced in support of these medicines exerting such a power appear more conclusive than those brought in proof of any of the other explanations of the operations of medicines, founded on the mechanical physiology: hence they have generally commanded assent. Astringents, it is observed, exert this corrugating power on dead matter; they are serviceable as medicines in those affections which seem to depend on a relaxed state of the solids; they even corrugate the fibres of living matter, as is evident from the sensation they impress on the tongue and fauces; and applied to bleeding wounds, they restrain the flow of blood apparently by the same power.

We cannot, however, admit, without limitation, the supposition on which this hypothesis is founded,—that the affections which astringents obviate depend on mechanical laxity of the solids, and that these substances act solely by removing that laxity, by inducing a mechanical or chemical change. Debility was indeed once ascribed to such a cause, but with little reason: every degree of strength or weakness depends more on correspondent variations in the state of the powers peculiar to living matter; and substances capable of obviating disease dependent on any state of debility, must be such as are capable of acting on these powers. Many substances, accordingly, arranged as Astringents, occasion considerable alterations in some of the functions: they produce effects which cannot be referred to their condensing power, allowing them to possess it; and, therefore, in all the changes they produce, part of their operation at least must be referred to actions which they exert conformable to the laws of the living system.

For reasons of this kind, some have denied the existence of such a class of medicines as astringents. The substances which have

received that appellation they have considered as moderate stimulants, permanent in their action, and as differing little therefore from tonics.

It must be admitted, however, that there are substances which immediately restrain excessive evacuations; and that although between these and tonics there is in several respects a resemblance, in others they differ widely. The most powerful astringents, oak-bark for example, or galls, are much inferior in tonic power to other substances having little or no astringency; while there are powerful tonics which do not produce the immediate effects of astringents.

There appears, therefore, to be a foundation for establishing such a class as astringents, though it is difficult to point out the precise nature of their operation. It must be admitted, perhaps, that astringents possess a power of corrugating or condensing the animal fibre. The sensation they excite in the mouth appears to be a sufficient proof of this, and it is farther established by chemical facts. That they likewise act as permanent stimulants, is proved by their power of removing intermittent fever, and other states of the system connected with debility. The one power may be conceived to modify the other; and to this modification, or to their combined action, their effects may be ascribed.

Darwin advanced an hypothesis, that they act by producing absorption. This accounts for some of their effects, but not for others, particularly for their power of stopping hæmorrhage.

Astringents from the power they possess, are applied extensively to the treatment of diseases.

As stimulants, acting with considerable permanence, they may be substituted for tonics in diseases of debility. It has been found accordingly, that they have power to stop the paroxysm of an intermittent fever, when given a short time before its accession; and in cases of debility, they seem to be often of utility, independent of their power of checking debilitating evacuations.

It is, however, for restraining increased evacuations that astringents are usually employed. Hæmorrhage, where it does not arise from a solution of continuity, depends on the force of contraction in the extreme arterial branches not being sufficient to resist the impulse of blood from the larger branches,—a deficiency of contraction generally arising from a debilitated state of these vessels. Astringents are stimulants, slow and permanent in their action, and not sensibly increasing the force of the circulation, are calculated to obviate such a state: and this may be farther promoted by their corrugating power, which may be extended from the stomach by sympathetic action to the vascular fibre; somewhat in the same manner that the constringing effect of cold suddenly applied is extended from the surface of the body. Hence their use in menorrhagia, hæmoptysis, and other discharges of blood; though they likewise frequently fail, from their operation being too slow and feeble to resist the impetus of the circulation, or counteract the flow from a ruptured vessel. In epistaxis, or bleeding wounds, they are more powerful, as they can be more directly applied to the part.

By an operation probably similar, astringents check serous effu-

sions; hence their use to restrain colliquative sweats. In diarrhœa too, they appear to operate by checking the effusion of fluid from the exhalant vessels of the intestines, and thus diminishing the increased stimulant operation, which, from this cause, is exerted on the moving fibres of the canal, and increases the peristaltic motion. In the latter stage of dysentery, where an increased evacuation appears to be connected with debility of the exhalant vessels, their cautious administration is advantageous. And in passive inflammation, attended with increased serous discharge, as in gleet, and in some forms of ophthalmia, the topical application of astringents affords the most successful mode of treatment.

In the administration of astringents, it is an obvious caution, that they ought not to be applied to check evacuations, where these are critical, or where they are necessary to relieve a plethoric state of the vessels, or a state of increased action; at least unless the evacuation proceed to an alarming extent.

Some narcotics, as opium, produce effects apparently astringent. When increased discharges take place from irritation, these remedies, by diminishing irritability, lessen the discharge; they are thus serviceable both in hæmorrhage, and in diarrhœa arising from that cause. But their mode of operation is obviously different from that of astringents; and in the cases in which they are of benefit, the latter would be useful, and only by an indirect operation.

Astringents may be subdivided into those belonging to the mineral, and those belonging to the vegetable kingdoms, which differ considerably from each other in their chemical properties, and probably therefore in the mode in which they produce their astringent effect. All the vegetable astringents of any considerable power contain tannin, and hence it has been considered, perhaps with justice, as the principle in which their astringency resides. Whether they produce their astringent effect by the tannin combining chemically with the animal fibre, as their corrugating effect in dead animals is produced, cannot be determined. We can scarcely conceive of any other mode of operation; yet any change of this kind, if it did take place, might be expected to be more permanent, and productive of more important effects than it actually is.

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## ASTRINGENTS.

### FROM THE MINERAL KINGDOM.

Acidum sulphuricum.
Alumen.
Calx.
Ferrum.
Zincum.
Cuprum.
Plumbum.

### FROM THE VEGETABLE KINGDOM.

Quercus robur.
Quercus infectoria.
Tormentilla erecta.
Polygonum bistorta.

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| ANCHUSA TINCTORIA. | PTEROCARPUS DRACO. |
| HÆMATOXYLON CAMPECHIANUM. | PISTACIA LENTISCUS. |
| ROSA GALLICA. | KRAMERIA TRIANDRA. |
| ARBUTUS UVA URSI. | LYTHRUM SALICARIA. |
| ACACIA CATECHU. | [GERANIUM MACULATUM.—B.] |
| PTEROCARPUS ERINACEA. (KINO). | [STATICE LIMONIUM.—B.] |

### OF ASTRINGENTS FROM THE MINERAL KINGDOM.

ACIDUM SULPHURICUM. Sulphuric Acid.

SULPHUR combines with oxygen in different proportions; when united with the largest proportion, it forms an acid extremely powerful from its state of concentration, the Sulphuric Acid. This acid used to be obtained from the decomposition of sulphate of iron, the Green vitriol of commerce, by heat, and hence the name of Vitriolic Acid which was given to it. It is now formed by the combustion of sulphur. The sulphur, reduced to powder, is mixed with from one-eighth to one-tenth of its weight of nitrate of potash; the mixture, in small quantities, is kindled upon a hollow stone, placed within a large leaden chamber, the bottom of which contains water to the depth of two inches, and which is closed, or only occasionally opened to admit the renewal of the atmospheric air. The sulphur in burning takes a portion of oxygen from the nitre, and evolves nitric oxide gas, which, mingling with the air of the chamber, is converted into red vapours of nitrous acid, at the same time the burning sulphur is producing sulphurous acid gas; these two acid gases, with a portion of watery vapour, meeting, combine into a crystalline compound, which falls down into the water, and is decomposed by it, being resolved into sulphuric acid, that remains in the water, and nitric oxide gas, which rises again into the chamber. There, mingling with air, it receives oxygen, becomes again nitrous acid, combines with another portion of sulphurous acid and watery vapour, forming the crystalline compound, which, as before, falls into the water, and is resolved into sulphuric acid and nitric oxide gas. In this manner, a small quantity of nitric oxide gas, by alternately taking oxygen from the air admitted into the chamber, and transferring it to the sulphurous acid gas which mingles with it, causes the production of a large portion of sulphuric acid. It was long before this theory of the process was developed; and it seemed remarkable, that the nitre should be indispensable to the success of the process, and yet so little of it be required.

When the water at the bottom of the chamber has received a considerable quantity of sulphuric acid it is withdrawn, is concentrated by evaporation, and afterwards by boiling in glass retorts.

Sulphuric acid, prepared by this process, is of the specific gravity of 1.845, and at this degree of concentration one equivalent of acid, 40, is combined with one of water, 9,=49, and hence the common acid is properly hydro-sulphuric acid. It was formerly supposed that it could not be procured free from water, but a method of preparing pure anhydrous sulphuric acid was discovered by M. Bussy. The anhydrous acid is solid, white and fuming. Liquid sulphuric acid

in its usual state of concentration, is of a thick consistence, and has an apparent unctuosity; it is colourless and transparent; is highly corrosive, and possesses all the general acid properties in an eminent degree. From its corrosive power it cannot be used for internal administration in the concentrated state; the Acidum Sulphuricum dilutum of the College is employed.*

As a medicine, sulphuric acid in a dilute form is employed as a refrigerant, but principally as an astringent, and in this property it is undoubtedly superior to any other acid. It is used as an astringent to check the flow of blood in hæmoptysis, and the colliquative sweat in hectic fever; indications which it fulfils better than any other article in the Materia Medica. It is sometimes also used in menorrhagia and diabetes; and, as a tonic, founded on its astringent property, in dyspepsia. It checks fermentation in the stomach, quenches thirst, and increases the appetite. In malignant erysipelas with a tendency to hæmorrhage, it has been given, according to Dr. A. T. Thomson, in the quantity of an ounce in twenty-four hours. From its refrigerant and antiseptic power it is serviceable in putrid diseases, in low typhoid fevers, diabetes and cutaneous disorders; its favourable effects in the latter appear to be owing to its passing off by the skin, when it is taken in considerable quantities or continued for a length of time. Its dose is from 15 to 30 drops, which may be taken in a cupful of water with a little syrup or mucilage added to it, or in bitter and astringent vegetable infusions. The "aromatic sulphuric acid," in which it is diluted with alcohol impregnated with aromatics, is a convenient form of it for internal use. From its astringency, sulphuric acid is added to gargles which are employed to check salivation, or relieve relaxation of the uvula. Externally it is used as a wash for ulcers; and mixed with lard in the proportion of half a drachm to an ounce it has been used with advantage in psora.

*Offic. Prep.*—Acid. sulph. pur. Acid. sulph. dil. Acid. sulph. arom. Ung. acid. sulph.

ALUMEN. SUPER-SULPHAS ALUMINÆ ET POTASSÆ. Alum.

THE composition of this salt is complicated; it consists of one equivalent of sulphate of potash, 88, three equivalents of sulphate of alumina, 174, and twenty-five equivalents of water, 225,=487. Some of the forms of it met with in commerce contain ammonia or soda, but without change of its medicinal properties. Alum is found native, efflorescing generally in the interstices of what is named alum slate; or it is prepared from what are named alum ores, which consist essentially of clay impregnated with sulphur, or sulphuret of iron. The ore being calcined is exposed to atmospheric air; the sulphur absorbing oxygen forms sulphuric acid, which unites with the argillaceous earth of the clay, with a portion of potash which the ore often contains; or if this alkali is not present in sufficient quan-

* *Incompatible Substances.* All substances that combine with this acid are of course incompatible with it. Such are most of the metals, their oxides, some of the earths, their carbonates, and the alkaline carbonates, acetate of lead, and muriate of lime.—B.

tity, carbonate or sulphate of potash, or sometimes even muriate of potash, is added to afford it: sometimes too a portion of impure ammonia, obtained by distilling urine or bones, is employed. The liquor is concentrated by boiling, so as to yield, on cooling, the alum in a solid state, of a crystalline structure.

This salt is in large octohedral masses, transparent, colourless, and vitreous in appearance; it has a styptic taste, with a degree of sweetness. It reddens the vegetable colours from the alumina not being able to neutralize the acid. It is soluble in eighteen parts of cold, and in less than two of boiling water. The variety, termed Roche or Rock Alum (Alumen Rupeum,) is in similar fragments, efflorescent on the surface, and of a reddish colour. The large quantity of water of crystallization which alum contains causes it to liquefy when exposed to moderate heat; when it is expelled by the continuance of the heat, a white spongy mass remains, named Calcined or Dried Alum.

Alum, from its astringent power, is employed to check hæmorrhages and serous evacuations; it is thus given in menorrhagia, leucorrhœa, and diabetes; and in leucorrhœa is perhaps more successful than any other astringent. It has likewise been used with advantage in colic, given in large doses of 20 grains, and is said to afford speedy relief. Its ordinary dose is from 5 to 10 grains. The addition of an aromatic is generally necessary, to prevent it from exciting nausea, when it is given in the solid form; but the best form of administering it is that of Alum Whey, (Serum Aluminosum,) prepared by adding two drachms of pounded alum to a pint of hot milk; the dose of this is 3 or 4 ounces. Externally alum is frequently used as the basis of astringent gargles, and of injections used in gleet; and dissolved with sulphate of zinc or copper, it forms very styptic solutions, employed to check hæmorrhage by direct application.*

*Offic. Prep.*—Alum exs. Pulv. alum. Liq. alum. Catap. alum.

Calx. Lime. Calx Viva. Quicklime, (p. 127.)

This earth is found abundantly in nature, in several states of combination. It is usually obtained by exposing any of its native compounds with carbonic acid,—chalk, limestone, or marble, to a heat gradually raised to a degree of intensity sufficient to expel the acid: the lime remains more or less pure. It is soluble in water, in sparing quantity; about 700 parts being required for its solution. Yet even in this weak state of impregnation, the solution, which is known by the name of Lime Water, (Aqua Calcis,) prepared by agitating water with slaked calcined lime, has a strong styptic taste, and is capable of exerting important chemical agencies, as well as of acting on the living system. As an astringent, lime water is employed in diabetes, and in diarrhœa: the dose is one or two pounds in the course of the day. It is used likewise in dyspepsia, in which it proves useful, more by its tonic and astringent power, than by its ef-

* *Incompatible Substances.* Alkalies and alkaline salts, carbonate and muriate of ammonia, carbonate of magnesia, tartrate of potash, lime water, super-acetate of lead, the salts of mercury, as well as many vegetable and animal substances, especially galls and kino.—B.

fect in neutralizing acid in the stomach. Mixed with milk it is given to children to dissolve mucus in the bowels, and to kill intestinal worms. Externally it is applied as a wash to ill-conditioned ulcers, and in tinea capitis.

*Offic. Prep.*—Aqua calc. Aq. calcis comp. Lin. aq. cal.

Ferrum. Iron.

This metal has been already considered as a tonic, (p. 116): it is likewise employed as an astringent to check increased evacuations. It is thus used with advantage in some forms of passive hæmorrhage, particularly menorrhagia. The advantages derived from it in such cases may be supposed to depend on its tonic power; the styptic taste, however, of its saline preparations is a sufficient proof of the presence of astringency to a certain extent; and it is not improbable that this may coincide with, or modify the operation connected with its action as a tonic. The sulphate and the muriate of iron are the preparations in which the astringent property is most obvious.

Zincum. Zinc.—This metal has likewise been considered as a tonic, (p. 119.) Its saline preparations have, however, a considerable degree of astringency; and there are several medicinal applications of them founded on this quality.

Sulphate of Zinc (Sulphas Zinci) has been employed internally as an astringent in chronic dysentery, and in the treatment of intermittent fever; but from its emetic power, its operatión is liable to be harsh, and is not easily regulated. Its solution is in common use as an injection in gonorrhœa when the inflammatory state has subsided, and in gleet, two grains being dissolved in an ounce of water; and it frequently succeeds in checking the discharge, apparently from its astringent power. A solution of nearly the same strength is used as a collyrium in ophthalmia; the astringent power of this being increased, according to a formula in the Edinburgh Pharmacopœia, by the addition of a few drops of diluted sulphuric acid. Dissolved with alum, it forms a very styptic liquor, which is an officinal preparation, and has long been in use for stopping hæmorrhage, and checking increased discharges, by external application.

Acetate of Zinc, under the form of solution, is obtained by adding a solution of acetate of lead to a solution of sulphate of zinc, a mutual decomposition taking place, and sulphate of lead being precipitated, while acetate of zinc remains dissolved. This has been in use as a mild astringent injection in gonorrhœa, less liable to produce irritation, or to check the discharge suddenly, than the solution of sulphate of zinc, and rather more active than the solution of acetate of lead; likewise as a collyrium in ophthalmia. A solution of the salt in alcohol has been introduced into the Dublin Pharmacopœia, and is used largely diluted with water.

Cuprum, (p. 120.)—Copper has so far an analogy to the preceding metals, that, along with the general action which it exerts on the system, capable of obviating spasmodic affections, it has a degree of astringent power. This is conspicuous principally in its

combination with sulphuric acid, the bisulphate of copper, or blue vitriol. This salt, in solution, is sometimes used externally as an astringent; and dissolved with alum in water, to which a portion of sulphuric acid is added, (solutio sulphatis cupri composita,) it is applied to restrain hæmorrhage.

Plumbum. Lead.—This metal, when rendered capable of acting on the system by oxidation, or combination with acids, produces very deleterious effects, and proves a powerful, though insidious poison. Nor is it easy to explain its mode of action. It appears to act peculiarly on the muscular fibre, repressing action, and at length exhausting the irritability of the muscles. When introduced slowly into the system, the intestines are first affected, constipation from diminished action takes place, accompanied frequently with severe pain. Tremor and debility of the voluntary muscles succeed, and are followed by paralysis, the muscles losing their firmness and cohesion. When a large quantity of any of the active preparations of lead is received into the stomach, these symptoms occur suddenly and with violence, giving rise to the disease named Colica Pictonum, which is also sometimes suddenly induced by the progressive accumulation of the metal in smaller quantities. A sense of constriction is felt in the stomach and bowels, with obstinate constipation and the most severe pain; the pulse is small and hard; respiration becomes laborious; there is general muscular debility and tremor, accompanied with cold sweats and convulsions, which have often a fatal termination. In cases of poisoning from swallowing any of the soluble salts of lead, the best antidote seems to be a solution of some salt containing sulphuric acid, such as sulphate of magnesia, or sulphate of soda; the lead will be precipitated in the state of sulphate of lead, a substance quite harmless and inert. Of the effects of lead introduced in small quantities, instances are supposed to occur from the water conveyed to cities passing usually through lead pipes; but it has been proved by Morveau, and more fully by Dr. Christison, that although distilled water receives a noxious impregnation from lead, water holding saline substances in solution, as spring or river water, does not dissolve lead, but rather covers it with an insoluble crust, which prevents the possibility of impregnation. The presence of lead in a fluid may be detected by sulphuretted hydrogen, which throws down a dark coloured precipitate not soluble in dilute muriatic acid; if this precipitate be heated on charcoal before the blowpipe, metallic lead is obtained.

From Dr. Campbell's experiments, (Inaugural Dissertation,) it appears that lead, applied to a wound, is less active than the other mineral poisons. A saturated solution of acetate of lead, applied in small quantity, did not produce any deleterious effect; two drachms of the salt itself applied to a wound in the neck of a dog occasioned little immediate injury. Still the kind of action appears to be nearly the same, though more slowly induced. In the latter experiment, after a number of days, the power of motion in the limbs was impaired, the pulse became small and quick, the respiration difficult, the belly was swelled, and on the twenty-third day the animal died. On dis-

section, the internal surface of the stomach appeared inflamed, and part of the intestinal canal was also slightly inflamed, with intro-susception. In the production of these local effects, lead is analogous to other metallic poisons; and they farther display its peculiar determination to the intestines.

From the external application of lead, its usual deleterious effects have been stated to be produced, and numerous cases have been adduced in support of this. Infants have been observed to be affected with convulsions from the too free application of ceruse to the skin; and even in adults, pain in the abdomen, spasms of the muscles, and paralysis, have been induced from the application of saturnine solutions or cataplasms. Other facts again have been stated in opposition to these, seeming to prove that, from the most free external application of the preparations of lead, no injurious consequences whatever arise; and this appears to be confirmed by the freedom with which they are employed in common practice. It would appear that the influence of idiosyncracy exists to a great extent with regard to the action of lead, some individuals being much more susceptible of its action than others, as has been remarked in cases where it has been taken internally to nearly the same extent, from the use of articles of food or drink which have received an impregnation of the metal,—some suffering severely, while others sustained little injury.

From its power of repressing muscular action, lead produces effects analogous in some respects to those of astringents, and it is usually ranked as an astringent, though its mode of operation is probably dissimilar.

The preparations of lead which have been applied to medicinal use are the semi-vitrified oxide, the white oxide or sub-carbonate, and the acetate and super-acetate.

Oxidum plumbi semi-vitreum. Lithargyrum. Litharge.—This substance is usually obtained in the calcination to which lead is submitted, with the view of separating the silver frequently associated with it; the flame, with a current of air, being made to reverberate on the surface of the melted metal. It is in flakes of a yellow colour, with a vitreous lustre. It is the protoxide of lead partially fused by the heat to which it has been subjected. It is used only in some pharmaceutical preparations, particularly for forming, when boiled with oil, a plaster (Diachylon,) which serves as the basis of other compound plasters, and which is sometimes applied as a healing dressing to wounds.

Oxidum plumbi rubrum. Minium. Red Lead.—This is the deutoxide of lead, prepared by calcining lead with a fire gradually raised, and stirring the oxide constantly, to expose it better to the action of the air. It is scarcely used, and might be discarded from the Pharmacopœia.

Carbonas plumbi. Sub-carbonas plumbi. Cerussa. Cerusse, or White Lead.—Carbonate of lead is prepared by inclosing plates

of lead with vinegar in earthen vessels, which are exposed to a gentle heat, so as to convert the vinegar into vapour: it acts chemically on the lead plates; and a white crust is formed on their surface, which, when it has accumulated, is scraped off, and reduced to a fine powder by levigation. It consists of an equivalent of protoxide of lead, 112, and one of carbonic acid, 22, =134. It is used only externally, being applied in fine powder to slight cases of excoriation or inflammation, and used particularly to relieve these affections in children,—a practice, however, which, from some observations, appears not to be without danger, and which is unnecessary, as the levigated calamine stone answers equally well. It is used likewise as the basis of an ointment, (Ung. Cerus.) which is sometimes applied as a cooling dressing to inflamed parts.

Acetas et sub-acetas plumbi. Acetate and Sub-acetate of Lead.—The first of these compounds, the acetate of lead, is the salt which has been long known by the name of Sugar of Lead, (Saccharum Saturni); the other, a solution which was named Goulard's Extract of Lead, has been shown by Dr. Bostock to be a solution of the sub-acetate.

Acetas plumbi. Acetate of Lead. Sugar of Lead.—It is prepared on the large scale by the chemical manufacturer. It is in masses composed of slender prismatic crystals, aggregated, of a yellowish colour; it has a very sweet and styptic taste.* The medicinal use of this salt is nearly limited to its external application. Yet some practitioners have recommended it in cases of profuse evacuation, particularly in hæmorrhage, where other remedies have failed: it has thus been given in menorrhagia, in the dose of half a grain, repeated every four hours; it has likewise been employed in obstinate leucorrhœa, and to restrain the colliquative sweat accompanying hectic fever. It has likewise been lately much employed in hæmoptysis combined with opium; and some practitioners assert, that, by this mode of combination, the deleterious effects which might be apprehended from the introduction of lead into the system are completely obviated. When this medicine is given internally, the dose ought not to exceed one-third of a grain every four or five hours. From the deleterious agency, however, of lead on the system, it is a remedy which must be used with reluctance, and only in urgent cases.

As an external application, Sugar of Lead is often employed to obtain its astringent effect. A solution of it, of the strength of three grains to an ounce of water, is used as an injection in gonorrhœa; and producing no irritation, is not liable to be attended with the injurious consequences which sometimes arise from preparations more active. A solution rather weaker is employed as a collyrium in oph-

* *Incompatible Substances.* All those acids and their compounds which form with oxide of lead, salts nearly insoluble in water, such as the sulphuric, muriatic, carbonic, citric and tartaric—lime water, the alkalis, sulphuretted hydrogen, all astringent vegetable infusions, almost all animal substances, except gelatin, and undistilled water.—B.

thalmia, and can be applied with safety, even in the state of active inflammation. A stronger solution is a common application in superficial inflammation; and an ointment, of which it is the basis, is employed as a dressing to inflamed or excoriated parts.

The sub-acetate of lead forms the basis of Goulard's Extract,—a preparation which has long been in use among surgeons. It is named Liquor Plumbi Sub-acetatis, and is prepared by boiling vinegar on litharge. As a lotion it has the advantage over a solution of the acetate, that it has no tendency to crystallize; in other respects its medicinal qualities are similar.

*Offic. Prep.*—Ung. acet. plumb. Liq. plumb. sub-acet. dilut. Cerat. plumb. acet.

### OF VEGETABLE ASTRINGENTS.

The property of astringency in vegetables depends on the presence of a peculiar principle, to which the name of Tannin is given. This principle has an affinity to the animal principle gelatine, and forms with it a compound, tough, hard and insoluble in water, which is the basis of leather. From this affinity tannin corrugates the animal fibre, and renders it denser and harder. It is not easy to say in what manner the astringency of tannin acts on the living system. It may be supposed that corrugation, or some similar change, is produced by it in the fibres of the stomach, which may be propagated by sympathy to distant parts, nearly in the same way as the impression of cold is communicated. But the supposition that the corrugation is the effect of any combination of the tannin with the animal fibre it is difficult to admit.

Quercus robur. Oak. *Monœc. Polyand. Amentaceæ,* Linn. Juss. *Cupuliferæ,* Rich. *Cortex. Indigenous.*

The bark of the oak contains a larger proportion of tannin than that of any other tree. An ounce of bark afforded, in Davy's experiments on astringents, 111 grains of solid matter by lixiviation, of which 77 were tannin; but the quantity varies much according to the season and the age of the tree.

Oak bark has been used as a remedy in hæmorrhage, diarrhœa and intermittent fever, given in a dose from fifteen to thirty grains. In modern practice its strong infusion or decoction is occasionally employed as an astringent gargle in cynanche, as an injection in leucorrhœa and profuse menorrhagia, and as a fomentation in hæmorrhoids and prolapsus ani.*

*Offic. Prep.*—Dec. querc. Extr. querc.

Quercus infectoria. Dyers Oak. *Cynipis nidus. Gallæ, Galls. Asia Minor, South of Europe.*

The tubercles named Galls are found on the branches of this tree; their production is occasioned by the bark being pierced by an insect of the cynips genus, to deposit its eggs. The juice ex-

* *Incompatible Substances.* Lime water, alkaline carbonates, acetate of lead, sulphate of iron, gelatin.—B.

uding slowly, is inspissated and hardens. The best galls are heavy, knotted on the surface, and of a blue colour. They are nearly entirely soluble in water with the assistance of heat; the infusion reddens the vegetable colours from the action of the gallic acid, an acid which is associated in large quantity with tannin in galls, and, indeed, in most vegetable astringents. The proportion of tannin varies considerably in different specimens of galls. In Davy's analysis of Aleppo galls, 500 grains afforded to water by lixiviation 185 grains of solid matter, of which 130 were tannin, 31 gallic acid, 12 saline and earthy matter, and 12 supposed to be mucilaginous and extractive matter. Vauquelin found a remarkable difference between the infusion of galls and of oak bark, that the former throws down a precipitate from tartar emetic, which the other does not.*

In medical practice, galls, though powerfully astringent, are seldom internally administered. The strong infusion or decoction has been applied to the same purposes as the decoction of oak bark. And an ointment, composed of the galls in fine powder, with eight parts of simple ointment, is used as an astringent application to hæmorrhoidal affections.

*Offic. Prep.*—Tinct. gall. Ung. gall.

TORMENTILLA ERECTA. Tormentil. *Icosand. Polyg. Senticosæ,* Linn. *Rosaceæ,* Juss. *Radix. Indigenous.*

THE root of tormentil, which is small and knotted, is strongly astringent, with little flavour or bitterness; it owes its astringency to tannin, and, with the exception of galls and catechu, it contains more of this principle than any other vegetable. It has been used in diarrhœa under the form of decoction, and in intermittent fever in substance, in the dose of from half a drachm to a drachm. The root of Geum urbanum, or Avens, a plant belonging to the same natural family, has similar properties, and has been used in the same dose as a febrifuge.

POLYGONUM BISTORTA. Bistort. *Octand. Trigyn. Oleraceæ,* Linn. *Polygoneæ,* Juss. *Radix. Indigenous.*

THE root of this plant is a pure and very strong astringent, containing a large quantity of tannin, with some starch and gallic acid; as such it has been used in diarrhœa and in intermittent fever, in a dose from a scruple to a drachm. But having probably no superiority over other astringents, and no peculiar virtue, it has fallen into disuse.

ANCHUSA TINCTORIA. Alkanet. *Pentand. Monogyn. Asperifoliæ,* Linn. *Boragineæ,* Juss. *Radix. South of Europe.*

THE cortical part of the root of this plant has a deep red colour, which has the singular property of not being extracted by water, but readily expressed by oils, ether, and alcohol. Its watery infusion,

* *Incompatible Substances.* Metallic salts, especially those of iron, produce precipitates with infusion of galls, composed of tannin, gallic acid, and the metallic oxide. Sulphuric, muriatic, and nitric acids, the carbonates of tho alkalies and lime-water.—B.

however, strikes a dark colour with sulphate of iron, probably from the presence of tannin; and it possesses a slight degree of astringency; it is only employed to communicate colour to ointments.

HÆMATOXYLON CAMPECHIANUM. Logwood. *Decand. Monog. Lomentaceæ*, Linn. *Leguminosæ*, Juss. *Lignum. South America.*

THE wood of this tree is of a deep red colour; it has scarcely any smell; its taste is sweetish and astringent. Its active matter is extracted by water and by alcohol, leaving the ligneous fibre undissolved; both solutions strike a deep purple colour with the salts of iron, and give a precipitate with gelatin. A peculiar principle has been discovered in it by Chevreul, to which he has given the name of Hematine; it forms crystals of a reddish colour, which have a bitter, astringent, and acrid taste. Logwood has been employed as an astringent in diarrhœa and chronic dysentery, under the form of the decoction, or the watery extract. The extract has been proposed to be used as a substitute for kino.*

*Offic. Prep.*—Extr. hæmat.

ROSA GALLICA. Red Rose. *Icosand. Polyg. Senticosæ*, Linn. *Rosaceæ*, Juss. *South of Europe.*

THE petals of this species of rose have a slight degree of astringency, which is most considerable before they are expanded, and it is in this state that they are collected and dried for use. The infusion of the dried leaves, acidulated by the addition of sulphuric acid, forms a pleasant astringent gargle.

*Offic. Prep.*—Inf. ros. Cons. ros. Syr. ros. Mel. ros.

The petals of the Rosa Centifolia, Damask Rose, have no astringency, but are slightly laxative, and are employed from this quality in the preparation of a syrup, (Syr. ros.) which is sometimes given to infants. Their distilled water (Aq. ros.) is recommended as a vehicle by its grateful flavour.

ARBUTUS UVA URSI. Bears Whortle-Berry. *Decand. Monog. Bicornes*, Linn. *Ericineæ*, Juss. *Folia. Europe, America.*

THIS shrubby plant is a native of this as well as some of the other countries of Europe, and grows on our mountains. Its leaves, which are small, and of a dark green colour, have a bitter astringent taste, without any odour; they contain a large proportion of tannin, hence the watery infusion strikes a deep black colour with the salts of iron, and they are even used for the purpose of tanning.

From its astringency, Uva Ursi has been employed in menorrhagia and other fluxes. It has however been used more particularly in cystirrhœa, calculus, and ulcerations of the urinary organs. In checking the increased secretion of mucus from the bladder, which constitutes the first of these diseases, it appears to be superior to other astringents; it affords relief, probably by its action on the stomach preventing the generation of acid. More lately it has been

* *Incompatible Substances.* Acetate of lead, alum, the sulphates of copper and iron, tartarized antimony, sulphuric, muriatic, and acetic acids.—B.

recommended in phthisis; and some cases of cough, accompanied with symptoms of hectic, in which advantage was derived from it, have been related. In America it has been found serviceable in nephritic complaints. Its dose is half a drachm of the leaves in powder, twice or thrice a-day.

Acacia catechu. *Polygam. Monœc. Lomentaceæ*, Linn. *Leguminosæ*, Juss. *India. Ligni Extractum. Catechu. Terra Japonica.*

To this substance, formerly known by the absurd name of Japan Earth, the appellation of Catechu is now appropriated. The tree which affords it (formerly regarded as a species of Mimosa, but referred by Wildenow to a new genus, and named by him Acacia Catechu) is a native of India. The catechu is an extract prepared from its interior hard wood, by boiling it, cut into chips, in water; the decoction is evaporated; it is inspissated by exposure to the heat of the sun, and, by continued exposure, is rendered concrete and dry. It is of a yellow or brown colour, has a bitter and astringent taste, leaving an impression of sweetishness; but its qualities vary considerably, owing to its being prepared with more or less care, or even, as has been affirmed, to its being obtained from different plants. Two kinds are met with in the shops; one is of a light yellowish-brown colour, is smooth and uniform in texture, breaks short, is soft and light; the other is of a dark brown colour, more heterogeneous, heavier, and considerably harder.

Catechu is almost entirely soluble in water with the assistance of heat, the residuum consisting of accidental impurities. It is nearly equally soluble in alcohol. Its solution strikes a deep black colour with salts of iron, and gives an abundant precipitate with animal gelatin. From Sir H. Davy's experiments, it appears to be composed of tannin, extractive matter, and mucilage: the proportions in the best catechu being 54.5 of the first, 34 of the second, 6.5 of the third, and 5 residual matter. Dr. Bostock has remarked, that catechu gives indications of the presence of gallic acid, and that its watery infusion even reddens the more delicate vegetable colours.

Catechu is in common use as an astringent, and in the uniformity and certainty of its operation is probably equal, or even superior to any of the vegetable astringents. It is the astringent most commonly and successfully employed in diarrhœa: it is also used in chronic dysentery, and sometimes in passive hæmorrhagies. It is given under the form of the infusion, or the tincture; or the officinal preparation, the electuary of catechu, consisting of catechu and kino, with some aromatics and a little opium, is diffused in water, forming what has been named the Japonic Mixture, and which affords one of the best forms for its administration. In substance it may be given in a dose from 10 to 20 grains, which may be frequently repeated. Under the form of troches, it is sometimes used in relaxation of the uvula, or sponginess of the gums, being allowed to dissolve slowly in the mouth.*

*Offic. Prep.*—Elect. catechu. Inf. cat. Tinct. cat.

* *Incompatible Substances.* Metallic salts, especially those of iron, alkalies and gelatin.—B.

PTEROCARPUS ERINACEA. Kino tree. *Diadelph. Decand. Papilionac.* Linn. *Leguminos.* Juss.

THE substance distinguished by the name of Kino, was introduced a number of years ago into the Materia Medica as a powerful astringent, little being known with regard to its origin, farther than it was said to be the produce of Africa, and obtained probably from the plant affording it by exudation. Subsequent to its introduction it was met with in the shops very various in its qualities; it still is so, and is obviously of different origin. It would appear as Dr. Duncan remarks, that much of the kino of the shops bears the appearance of an extract artificially prepared, and is known to be formed from different astringent vegetables.

The African kino has been ascertained by Mr. R. Brown to be derived from the Pterocarpus Erinacea, a tree growing on the banks of the Gambia and Senegal. His authority is followed by the Colleges of London and Dublin. The Edinburgh College assigned the Eucalyptus Resinifera, or brown gum-tree of New Holland, as the plant of which kino was the concrete juice; and it seems to be proved, that the variety of kino which used to be imported from New South Wales was derived from this plant; but according to Dr. T. A. Thomson this kino is not now brought to this country. The former of these varieties of kino has the appearance of a natural production; slender twigs are intermixed in its substance; it is of a reddish-brown colour, with a resinous lustre, is very brittle, feels gritty between the teeth, and has a bitterish taste. The kind from New Holland has also the appearance of a natural production, fragments of bark being intermixed with it. It is in more solid masses than the other, is less brittle, and with its astringency has a disagreeable mawkish sweetish taste. The third kind has the appearance of an extract thoroughly dried; it is in small fragments, with a resinous fracture; is of a brown colour, nearly black, and has a taste astringent and slightly bitter. This Dr. Duncan has stated to be the produce of the Coccoloba Uvifera. I have been informed that it is the Extract of the Wood of the Mahogany. Kino, on analysis, affords a large portion of tannin, with resinous matter and mucilage.

Kino has been employed as an astringent for the same purposes as catechu, and they are often given in combination. The catechu, being more uniform in its qualities, ought perhaps to be preferred. Of the different varieties of kino, that to which the name was originally given, imported from Africa, is the most grateful, and appears to be the most active astringent.*

*Offic. Prep.*—Tinct. kino. Pulv. kino.

PTEROCARPUS DRACO. SANGUIS DRACONIS. Dragon's Blood. *Diadelph. Decand. Papilionaceæ*, Linn. *Legumin.* Juss. *Resina. South America.*

THE substance to which the absurd name of Dragon's Blood has been given is a concrete resinous substance, of a dark red colour and heterogeneous texture, varying also frequently in its qualities

* *Incompatible Substances.* The same as the galls.—B.

as it is met with in the shops. When genuine, it is the produce, by exudation, from incisions in the bark of the above tree. It is insipid; and though it has been considered as an astringent, has probably no such power, nor is it now applied to any medical use.

PTEROCARPUS SANTALINUS. Red Saunders. *Diadelph. Decand. Papilion.* Linn. *Legumin.* Juss. *India.*

THE wood of this species is of a very deep red colour, which it yields to alcohol, but not to water. It was once supposed to be astringent; but it is altogether inert, and is used only to give a colour to tinctures.

PISTACIA LENTISCUS. Mastiche. *Diœcia. Pentand. Amentaceæ,* Linn. *Terebinthaceæ,* Juss.

THE resin named Mastiche is the produce of this shrub by exudation, and is imported from the island of Chios. It is in small rounded fragments, of a light yellowish colour, nearly transparent, brittle, and hard, but, when pressed or chewed, becoming tenacious. It is chiefly resinous, and is hence dissolved by alcohol, a substance however remaining undissolved, tenacious and elastic, approaching in its characters to caoutchouc. Mastiche is insipid, and nearly inodorous, giving only a slightly fragrant smell when heated. Though it has been regarded as an astringent, and as such was at one time employed in medical practice, it has no activity, and might be discarded from the Materia Medica. It is used, from its insolubility and tenacity, to fill up the cavity in carious teeth.

KRAMERIA TRIANDRA. Rhatany. *Tetrand. Monogyn. Polygaleæ,* Juss. *Radix.*

RHATANY is the root of the Krameria triandra, which grows in Peru, and of the Krameria ixina, a plant of St. Domingo. It is in long cylindrical ramifications of a reddish colour. It used to be employed by the Portuguese merchants to give colour and astringency to port wine. Its extract has little taste, and, like kino, which it greatly resembles, consists chiefly of tannin. Its medical properties are similar to those of kino. It has a place only in the Dublin Pharmacopœia.

LYTHRUM SALICARIA. Loosestrife. *Dodecand. Monog. Salicariæ,* Juss. *Herba. Indigenous.*

LOOSESTRIFE is also inserted only in the Dublin Pharmacopœia. It is a perennial herbaceous plant, growing in marshy places. The leaves afford a mucilaginous and astringent decoction, which is much used in Ireland in chronic diarrhœa. The powder of the leaves is also given for the same disease, in the dose of a drachm thrice a-day.

[GERANIUM MACULATUM. Spotted Geranium. Common Cranesbill. *Monadelphia Decandria.* Nat. Ord. *Succulentæ. United States. Radix.*

THIS plant is found in abundance in every part of the United

States, and is generally to be met with in low grounds and the vicinity of damp woods. Its time of flowering is in May and June. In its medicinal properties this plant is decidedly astringent, the experiments of Dr. Bigelow having shown it to contain even a larger proportion of tannin than the Kino. In almost every case where vegetable astringents are called for, the Geranium may be advantageously exhibited. In chronic dysenteries, diarrhœa, and other debilitating discharges from the bowels, it has acquired great celebrity. Dr. Barton testifies to its virtues in the cholera of infants. In this case the preferable mode of giving it is in a decoction of milk. As a gargle it has been found very serviceable in aphthous eruptions and ulcerations of the mouth and throat. The Geranium may be given in powder, in doses of from 20 to 30 grains—in extract, 10 grains—in tincture, ʒj to ʒij—in decoction and infusion, from ℥j to ℥ij.—B.]

[STATICE LIMONIUM. Marsh Rosemary. *Pentand. Pentagyn.* Nat. Ord. *Aggregatæ. Radix.*

THE Marsh Rosemary is a perennial plant, flourishing in salt marshes. It is found in great abundance in the vicinity of this city, and flowers in the months of July and August. The root, which is the part used in medicine, is intensely astringent, and on chemical analysis is found to contain large proportions of tannin and gallic acid. As a medicine it is quite popular in this country, and has been prescribed with advantage in various diseases where astringents are indicated. In chronic dysentery it is said to have succeeded in effecting a cure after several other tonics and astringents had been used to no purpose. It has also proved successful in diarrhœa, cholera infantum, hæmoptysis, &c. In Cynanche Maligna, much advantage has been derived from its use when administered as a gargle in the form of decoction. The Rosemary may be given in infusion or decoction by adding ʒij of the root to ℥xij of water.—B.]

## SECOND DIVISION--OF LOCAL STIMULANTS.

UNDER this division are comprehended those remedies, the stimulant operation of which is directed to particular organs. It comprises Emetics, Cathartics, Diuretics, Sialagogues, and those various classes that have usually been arranged under the title of Evacuants, their local operation giving rise to increased secretion, or increased evacuation.

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# CHAP. VI.

### OF EMETICS.

EMETICS are defined, Medicines which excite vomiting, independent of any effect arising from the mere quantity of matter introduced into the stomach. This definition, however, requires to be more limited; for there are many substances which occasionally induce vomiting that are not usually ranked as emetics. All bitter and nauseous drugs have this effect, when given in large doses, or in an irritable state of the stomach; and it occurs frequently as the consequence of the action of stimulants and narcotics. The emetic operation, however, in these cases, is neither uniform nor certain; there are, on the contrary, a number of substances, many of which have no very nauseous taste, or which can have that taste concealed, but which still excite vomiting when given in a sufficient dose, in every individual, and in every state of the stomach. To these substances the appellation of Emetics is exclusively applied. They may therefore be defined--Substances which excite vomiting, independent of any effect arising from the quantity of matter introduced into the stomach, and independent of any nauseous taste or flavour, or of any narcotic or acrid power.

When an emetic has been given in a proper dose, the stomach remains for some time undisturbed. But in 10, 15, or 20 minutes, an uneasy sensation, with nausea, supervenes, which continues increasing until vomiting begins. While the nausea only is present, the countenance is pale, the pulse is feeble, quick, and irregular, and there is a feeling of cold; but during the action of vomiting the face becomes flushed, the pulse is quickened, though still feeble, and it remains so in the interval of vomiting. The vomiting generally recurs twice or thrice, and then ceases; a degree of nausea continues, which goes off only gradually; languor remains, with often a disposition to sleep; the pulse is weak and slow, but becomes gradually fuller; the skin is usually moist.

The general theory of the operation of vomiting is sufficiently evident. The vermicular or peristaltic motion of the stomach, by

which the food is propelled through the pylorus, is inverted; the diaphragm and abdominal muscles are excited to contraction; the pylorus is contracted, and the contents of the stomach are forcibly discharged upwards. In many cases of vomiting, especially when violent, the peristaltic motion even of the upper part of the intestinal canal is also inverted, and bile is brought from the duodenum.

At the same time, it is difficult to explain how the peristaltic motion is inverted by emetics. It is a singular fact, that any substance acting as an unusual stimulus on the stomach seldom increases its motion, so as to occasion a more speedy discharge of its contents by the pylorus. The motion, instead of being increased, is more commonly inverted, and hence vomiting is the effect peculiarly resulting from such local stimulant action. Nor is it easy to assign any cause for the specific operation.

Dr. Darwin gave a different explanation of the nature of vomiting. He considered it as the effect, not of increased, but of decreased action of the fibres of the stomach. When an emetic is administered, it produces, he observes, the pain of sickness, as a disagreeable taste in the mouth produces the pain of nausea; these uneasy sensations not being acutely painful, do not excite the organ into greater action, but rather repress the motions already existing. The peristaltic motion of the fibres of the stomach becomes languid from the want of the usual stimulus of pleasurable sensation, and in consequence stops for a time, and then becomes inverted, which gives rise to the phenomena of vomiting. In this hypothesis there is, however, equally a deficiency in explaining how the inversion of the motion is effected.

Some have supposed that the internal surface of the stomach is the part immediately affected by the action of the emetic, and that the diaphragm and abdominal muscles are called into action by association; while others suppose the diaphragm and abdominal muscles to be chiefly affected, and to be so in consequence of nervous irritation: the former opinion resting principally on the circumstance, that the inner surface of the stomach is the part more directly exposed to be acted on; the latter being founded on the fact observed by experiment, that, in vomiting, the stomach itself does not contract, and that all the phenomena of vomiting are excited by emetics injected into the veins, or applied to a wound. The strong and forcible contraction of the diaphragm seems to have the principal share in producing vomiting.

There is a considerable difference among individuals with regard to the facility with which vomiting is excited. This susceptibility is also liable to be altered by disease. In the greater number of febrile affections, vomiting is easily excited; while, in several of the diseases of the class Neuroses, as mania, melancholia, and hypochondriasis, it is excited with much more difficulty. In the case of poisons, which induce inflammation of the stomach, vomiting is almost a constant symptom; while in those which act by a narcotic power, and in which the irritability of the stomach is impaired, a powerful emetic is required to produce any effect.

Although nausea or sickness generally accompanies vomiting, this

connection is not a necessary one. Some emetics, as sulphate of zinc, act without occasioning much nausea; while others, as tobacco, excite it in a greater degree than is proportioned to their emetic power, a circumstance sometimes requiring to be attended to in the administration of individuals of this class.

The feeble and low state of the pulse which attends vomiting has been ascribed either to direct association between the motions of the stomach and those of the heart, or to the nausea excited, which, like other disagreeable sensations, not acutely painful, has a depressing effect, being equivalent to an abstraction of stimulus.

Emetics, at least those that are mild in their operation, do not appear to waste the irritability of the stomach: they have rather an opposite effect: hence digestion is often vigorous after vomiting, and hence, too, gentle emetics are often serviceable in dyspepsia, and in the temporary diminished tone of the stomach occasioned by intoxication.

The state of the stomach produced by vomiting seems to be often extended to the vessels of the skin; it is therefore followed frequently by diaphoresis, and is one of the most powerful means of removing spasmodic stricture from the surface of the body.

Emetics have a remarkable power of increasing absorption: hence the benefit they afford in anasarca, and the sudden disappearance of tumours which sometimes happens after violent vomiting.

Emetics frequently occasion increased evacuation from the intestinal canal; and if they fail to excite vomiting, very generally operate as cathartics. Some are more apt to have this effect than others, as the preparations of antimony compared with ipecacuan.

From the different indications which emetics are capable of fulfilling, they are adapted to the treatment of many morbid affections.

Where disease depends on a disordered state of the stomach arising from over distention, or the presence of acrid or indigestible matter, vomiting is the easiest and most effectual mode of affording at least present relief. Hence its utility in all cases of indigestion, impaired appetite, acidity in the stomach, pyrosis, or anorexia; in the symptoms arising from intoxication, and where poisons of any kind have been swallowed.

From the strong action of the diaphragm and abdominal muscles in vomiting, the gall-bladder and hepatic ducts are emptied of their contents; hence jaundice, owing to obstruction from biliary calculi, is sometimes suddenly relieved by vomiting. A similar pressure is supposed to be exerted during vomiting on the thoracic viscera; from this has been explained the expectorant effect of emetics, and the relief they afford in some varieties of asthma and catarrh.

In the varieties of febrile diseases, much advantage is derived from the administration of an emetic, especially in the commencement of the disease. In synocha, where there are symptoms of increased action, and particularly where there is a determination of blood to the head, full vomiting may be attended with danger; and in typhus, when fully established, it cannot always be expected to be of much benefit. Cases, however, occur, and particularly of a tedious character, arising from, or rather connected with, a deranged

state of the functions of the stomach, in which the exhibition of an emetic, though even in an advanced stage of the disease, especially if the tongue be loaded with a yellow fur, and there exists some epigastric tenderness, is attended at once with a complete solution of the fever. In general the emetic should be given in the evening, as its operation leaves a tendency to sleep, and to diaphoresis, which it is useful to promote.

Emetics have also been lately employed very extensively, especially by the Italians, in inflammatory disorders, with the view of depressing the system. For this purpose, the tartrate of antimony and potash is dissolved in a small quantity of water, and doses of a table-spoonful are given at short intervals; the patient at the same time is prevented from taking liquids, so that the depressing effects of the medicine may be more powerful, without incurring the possibility of its acting as an emetic. This mode of giving nauseating doses has been resorted to with great success in ophthalmia, and likewise in pneumonic inflammations, when it would be imprudent to employ general blood-letting. Some practitioners have gone so far as to treat pneumonia solely by large doses of tartar emetic. Nauseating doses of emetics are useful also in hæmorrhage, where full vomiting would be dangerous, the nausea diminishing the force of the circulation; it is therefore sometimes resorted to in hæmoptysis and menorrhagia.

From the powerful effects of emetics, their improper administration may be injurious, and there are various states of the system which prohibit their use, or allow them to be employed only with caution. During the operation of vomiting, the blood returns with more difficulty from the head, owing partly to the pressure on the descending aorta, and partly to the interrupted respiration, by which the transmission of blood through the lungs is impeded; hence the redness of the countenance and the vertigo which sometimes accompany it. From this cause, it must be attended with danger, where there are symptoms of determination to the head, and more especially in plethoric habits. From the strong action of the abdominal muscles exerted in vomiting, it has been considered as not without risk in visceral inflammation, in the advanced stage of pregnancy, and in hernia and prolapsus uteri. In extreme debility, there is danger of the patient sinking under the violence of the operation. The frequent repetition of emetics in chronic diseases is prejudicial, by weakening the tone of the stomach, and rendering its motions more liable to be inverted by slight causes.

The mode of administering emetics does not admit of many general observations. They should be given in the form of draught; as if in a solid form, the emetic might pass from the stomach into the intestines, without exciting vomiting. A common practice is to promote the action of emetics by taking large draughts of tepid water, or of an infusion of chamomile. If an emetic is given in a large dose, this is not necessary, as it will excite vomiting repeatedly at intervals; but if given in a moderate dose, it may excite vomiting only once; nausea, and efforts to vomit, will recur, however, at intervals, and then vomiting may be renewed by a draught of tepid

water, or of a bitter infusion. We thus obtain the advantages of repeated vomiting, without the risk attending a large dose of a powerful emetic. Too large a draught ought not to be taken, as it renders the operation more difficult or painful. Some acrid emetics, as mustard, require always to be largely diluted.

The most natural subdivision of this class is into Emetics from the Vegetable, and from the Mineral Kingdom.

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## EMETICS.

### FROM THE MINERAL KINGDOM.

| | |
|---|---|
| Antimonium. | Ammonia. |
| Zincum, | Hydro-sulphuretum ammoniæ. |
| Cuprum. | |

### FROM THE VEGETABLE KINGDOM.

| | |
|---|---|
| Callicocca ipecacuanha. | Nicotiana tabacum. |
| Scilla maritima. | [Lobelia inlfata.—b.] |
| Anthemis nobilis. | [Euphorbia ipecacuanha.—b.] |
| Sinapis alba et nigra. | [Spiræa trifoliata.—b.] |
| Asarum europæum. | |

### EMETICS FROM THE MINERAL KINGDOM.

Antimonium. Stibium. Antimony.

The metal to which this name is given, is peculiarly distinguished as an evacuant, and under various forms of preparation furnishes some of our most powerful cathartics, diaphoretics, and expectorants. All its preparations in larger doses act as emetics, and several of them are in common use for their emetic power. It is therefore under this class that its general history may be introduced.

Antimony occurs in nature combined with sulphur. The ore is of a grey or blue colour, with metallic lustre ; it is opaque, and has usually a striated texture. To free it from the earthy matter with which it is mixed, as it is dug from the vein, it is fused ; the fused sulphuret subsides, and is run off. Its lustre is greater the more completely it is purified. The proportions of its principles are various; sometimes they are nearly equal; in other specimens the quantity of metal is larger ; and there are some varieties unfit for medicinal use, as containing other metals, particularly lead, and sometimes copper. These have inferior lustre and a less distinctly striated texture.

The sulphuret of antimony has little activity, and indeed produces scarcely any sensible effect on the system. The preparations of the metal are much more active, and though of very different degrees of strength, retain the same mode of action, and possess therefore the same medicinal virtues. They do not exert any general stimulant operation on the system, but are always directed in their action

to particular parts, so as to occasion some sensible evacuation ; thus acting as emetics, cathartics, or diaphoretics.

The principal general medicinal application of antimony, under its different forms of preparation, has been for the cure of febrile affections ; and, in the treatment of fever, it has long been more or less extensively used. It is given either so as to induce vomiting or purging, or sometimes in smaller doses, so as to produce only gentle diaphoresis ; and, exhibited in either mode in the commencement of the disease, it has been considered as capable of cutting short its progress. The use of James's powder, which is an antimonial, has been extensive with this view, and both it and the tartrate of antimony and potash, or *emetic tartar*, continue to be used. Their efficacy has usually been ascribed to the evacuation they occasion, while others have considered antimony, apparently with little reason, as exerting an action specific or peculiar in itself in the removal of febrile action, and not explicable on the known effects it produces. The practice of giving antimonials in fever is unquestionably often attended with marked advantages ; yet it is also liable to considerable difficulties, and is not without some hazard. The administration of the remedy, whatever antimonial be employed, is not easily regulated with precision : in small doses it often fails of producing the favourable crisis expected from its operation ; and in larger doses it is liable to act with violence, and produce evacuations, under which the powers of the system have sunk. It is principally in the commencement of fever that the practice is successful ; in the more advanced stages, when the state of debility is induced, more hazard attends its employment, and less benefit is to be expected from it.

Antimonials are administered with advantage in intermittent as well as in continued fever, in the phlegmasiæ and exanthemata, and even in several of the profluvia, probably from their evacuating operation.

As an emetic, antimony is distinguished by the certainty, extent, and permanence of its operation. The action it excites in the stomach is both more forcible, and continues for a longer time, than that from other emetics, and hence it produces more complete evacuations, and occasions in a greater degree all those effects which result from the action of vomiting. Its action is also less local. It is generally extended to the intestinal canal, so as to produce purging, and very frequently to the surface of the body, so as to occasion diaphoresis or sweat. It is used more particularly, where the effects of full vomiting are required ; but where these are not wished for, more gentle emetics are usually preferred : the antimonial emetics, even the emetic tartar, which is the mildest, and the one most easily regulated, are always liable to prove harsh in their operation ; they occasion severe vomiting, debilitate the stomach, and are altogether unfit for administration to children, or to those of weak and irritable habits.

Of the preparations of antimony, it is necessary to take only a very cursory view, as they are to be more fully noticed in the pharmaceutical part of the work.

Levigated Antimony, (Sulphuretum Antimonii Præparatum,) is

merely the native sulphuret reduced to a state of mechanical division. It has been given as a diaphoretic, but is so inert and uncertain that it is now discarded from practice.

The Oxides of antimony are more active, but they are liable to the inconvenience of being uncertain in their operation, partly from their activity being dependent on the state of the stomach with regard to acidity, partly from the different degrees of oxidation in which they may exist, and which are not easily rendered uniform, and partly too from their state of aggregation. There appear to be three oxides of antimony. The protoxide, which is the basis of the salts of antimony, is composed of one atom of antimony and one of oxygen; the deutoxide contains an atom and a half, and the peroxide two atoms of oxygen. The following are the preparations of the oxides of antimony.

Oxidum Antimonii cum Phosphate Calcis, also named Pulvis Antimonialis.—This is prepared by exposing to heat sulphuret of antimony and bone-shavings, until they are converted into a grey-coloured substance, which is then exposed in a crucible to a more intense heat, until it become white. By the high temperature the animal matter of the bones is decomposed, the sulphur of the sulphuret is dissipated, the metal is oxidated, and this oxide remains mixed or combined (part of it being also in a vitrified state) with the phosphate of lime of the bones. The preparation is similar in composition to the celebrated James's Powder, for which it is designed as a substitute. It acts as a diaphoretic, emetic, or cathartic, according to the dose in which it is administered, and has been employed principally as a remedy in fever, to arrest the progress of the disease at its commencement, or, in its more advanced stages, to obtain a favourable crisis. It is given in a dose from 5 to 10 grains, repeated, if necessary, after an interval of five or six hours, until sweating, purging, or vomiting is induced. It is, however, very uncertain in its operation.

Sulphuretum Antimonii Precipitatum.—This may be regarded as a hydrosulphuret of protoxide of antimony. It is of an orange colour. In a dose of from 5 to 10 grains, it produces the usual effects of antimonials, and has been employed as a remedy in fever; but, from the uncertainty of its operation, it is discarded from practice. An analogous preparation, named Kermes Mineral, is used on the Continent; it differs from the former in containing more of the protoxide of antimony, whence it may be rather more active.

Oxidum Antimonii Nitro-muriaticum of the Dublin Pharmacopœia is protoxide of antimony, with a small portion of muriatic acid adhering to it. It is designed to be employed in the formation of emetic tartar.

VITRUM ANTIMONII. Glass of Antimony.—This is a sulphuretted oxide of antimony, introduced lately into the Materia Medica by the London College, to be employed in the preparation of emetic tartar. It is procured by slowly roasting the native sulphuret of antimony in a shallow vessel: part of the sulphur is driven off, and part of the metal is oxidated; a strong heat is then applied, which melts the whole

into a glassy substance of a reddish colour, termed *glass of antimony.* It is composed of about 8 parts of protoxide and one of sulphuret of antimony, with 10 *per cent.* of silex.

By combining the oxides of antimony with an acid, the sources of uncertainty in their operation are in a great measure removed, as their degree of oxidation is rendered determinate, and their activity is not influenced by the state of the stomach with regard to acidity. The greater number of these saline combinations, however, are too acrid to admit of internal administration, and there is one only, that in which the oxide of antimony is combined with tartaric acid and potash, employed in practice. Of all the antimonials, this is most extensively used, and it is also the principal emetic derived from the mineral kingdom.

This preparation is the Emetic Tartar of the old nomenclature, the Tartrate of Antimony and Potash, (Tartras Antimonii et Potassæ,) improperly named in two of the Pharmacopœias, Tartras Antimonii, and Antimonium Tartarizatum. It is obtained by boiling bi-tartrate of potash with oxide of antimony, and procuring the double salt by evaporation. Its crystals are triedral pyramids, generally small; and it is readily soluble in water.*

Tartrate of antimony and potash is the only antimonial now used as an emetic; as, with a degree of activity, which admits of its being administered with safety, its operation is certain and uniform. It usually excites vomiting in the dose of a grain, or a grain and a half; but the proper mode of administering it is in divided doses, three or four grains being dissolved in four ounces of water, and an ounce of this solution being given every quarter of an hour until it operate. It generally excites full vomiting, and is liable to be more harsh in its operation than the vegetable emetics, such as ipecacuan, evacuating not only the contents of the stomach, but inverting even the motion of the duodenum, and either by this, or from the compression exerted by the action of the muscles on the abdominal viscera, causing bile to be discharged; it also frequently excites purging. In many cases, however, these are advantages; and in such cases, as well as in all morbid affections, where the stomach is not easily affected, it is the emetic properly employed; while, when the stomach is irritable, where its contents are merely to be evacuated, or when the system is in a debilitated state, the milder emetics are to be preferred. Assisted in its operation by tepid diluents, it may be brought to operate as a diaphoretic, and to produce the effects of antimonials on the general system, though, from its action being exerted at once on the stomach, owing to its solubility, it is more difficult to administer it with this intention, without occasioning nausea or vomiting, than some of the less active antimonials, as the phosphate of antimony and lime.

Tartar emetic has of late, by the recommendation of Rasori and Laennec, been much used in inflammatory diseases, particularly in

* *Incompatible Substances.* Mineral acids, alkalies, and their carbonates, most of the metals, soaps, hydro-sulphurets, infusions and decoctions of bitter and astringent vegetables, such as cinchona, &c. infusion and tincture of galls and rhubarb. —B.

pneumonia and bronchitis, where bleeding could not be employed with safety. In such cases, very large quantities of this substance, which has usually been considered an active poison, have been given without producing any violent symptoms. From the experiments of Orfila, it was believed that 20 grains of tartar emetic would occasion death; yet Laennec gave 40 grains, and others have given 60 grains in twenty-four hours, without producing any dangerous irritation of the alimentary canal, or even a perceptible effect of any kind. The explanation of this singular fact, given by Professor Rasori, is, that the peculiar diathesis, or the state of the system accompanying the disease, prevents the ordinary action of the tartar emetic; and that it is only when the disease begins to yield that this substance can produce its usual effects; accordingly, he found, that when the patients began to recover, it was necessary to diminish rapidly the quantity of the doses. The explanation may be received as satisfactory; indeed, we may remark the same circumstance in the action of other medicines; mercury, for instance, given to affect the constitution in a state of disease, does not produce salivation till the disease has begun to give way.

In the practice alluded to, the tartar emetic is given in doses of one, two, or three grains every two hours, till the inflammatory action is overcome. Another mode of exhibiting the remedy, is to dissolve twenty or thirty grains in the smallest possible quantity of water, and give this quantity in one dose, on an empty stomach, and restricting the patient from drinking any fluid during its operation. It is affirmed, that the effects produced by such a dose are not different from those occasioned by repeated doses of one or two grains; the latter method has not been tried in this country. Dr. Christie states, however, that in a case of Indian cholera he gave a dose of twenty grains of tartar emetic, which produced but little vomiting and moderate purging.

Dr. Christison is of opinion that the poisonous power of tartar emetic has been overrated, but that it is probable that a dose of a scruple, taken when the system is in a state of health, may occasion irritation so violent as to terminate in death. Of antidotes to tartar emetic, cinchona appears to be the most effectual; an ounce of the decoction will decompose and render inert a scruple of the salt; the infusion and tincture of cinchona are equally efficient. Dr. Duncan used with success a solution of sulphuret of potash. Applied to a wound, tartar emetic occasions vomiting; and if in a concentrated state, produces insensibility, paralysis, and the other effects of mineral poisons, bearing, indeed, a strict resemblance in its action to arsenic: bleeding and opium should be resorted to.

Vinum Tartratis Antimonii.—This name is given to a solution of tartrate of antimony and potash in white wine, in the proportion of two grains to the ounce. It is intended as a substitute to what was formerly named Antimonial Wine,—a preparation obtained by digesting wine on oxide of antimony, and which owed its power to the portion of oxide which the tartaric acid of the wine dissolved. It is principally as a diaphoretic that antimonial wine has been employed in a dose of one drachm, its operation being often promoted by com-

bination with tincture of opium. [For further information concerning antimony, see Part II. " Metallic Preparations."]

Zincum. Zinc.—Sulphate of Zinc, it has already been remarked, is a powerful emetic. It is not employed in common cases, in which an emetic is indicated, but it is had recourse to, as it operates speedily, and with much force, in cases where it is of importance that the contents of the stomach should be immediately evacuated, but where it is difficult to excite vomiting, as where any narcotic poison has been swallowed. Its dose is from 5 to 20 grains, according to the state of the stomach ; it should be given in solution, in three or four ounces of water.

Cuprum. Copper.—Sulphate of Copper acts as an emetic, and its operation takes place almost as soon as it has reached the stomach, and without inducing much nausea. It has hence been recommended in some cases, where the object is merely to obtain the mechanical effects from the operation of vomiting, as incipient phthisis, in which advantage has been supposed to be derived from the compression exerted on the thoracic viscera. Its operation is, however, liable to be very harsh, even in the small dose of 1 or 2 grains, in which it has been prescribed. In a larger dose, it has sometimes succeeded in producing vomiting, where the stomach, from the operation of a narcotic poison, has not been affected even by the sulphate of zinc. In such cases, where the irritability of the stomach is greatly impaired, and the patient is nearly in a state of insensibility, it has produced instantaneous vomiting, when given to the extent of 10 or 15 grains dissolved in water ; and, therefore, in very urgent cases, or where the tartrate of antimony or sulphate of zinc has failed, it may be employed with propriety.

Ammonia. Ammonia. Volatile Alkali.—Ammonia exists naturally in the gaseous form, but is condensed in very large quantity by water ; and this solution, for the preparation of which formulas are given in the Pharmacopœias, is the form under which it is applied to different medicinal purposes. It is capable of fulfilling various indications ; it in particular acts as a diaphoretic, antacid, and externally as a rubefacient. Under some of these classes it is to be more fully considered. It operates as an emetic when given in a pretty large dose, and is sometimes employed to quicken the operation of other emetics where they have failed ; a tea-spoonful being given in a cupful of cold water, and a draught of tepid water being swallowed after it.

Hydro-sulphuretum ammoniæ.—The hydro-sulphuret of Ammonia, obtained by passing a current of sulphuretted hydrogen gas through a solution of ammonia in water, was introduced into practice by Dr. Rollo. It acts with much energy on the stomach, inducing nausea in a small dose, and in a larger dose occasioning vomiting. It is scarcely used as an emetic, but rather as a nauseating remedy; and the principal application of it has been in the treatment of dia-

betes, with the view of reducing the morbid appetite, and increased action of the stomach. It was given at its introduction in a dose of from 5 to 15 drops twice a-day, and in different cases with advantage, so far as related to the reduction of the increased action of the digestive organs: and where this indication is to be fulfilled, no remedy seems better adapted to it.

### ON EMETICS FROM THE VEGETABLE KINGDOM.

IPECACUANHA. Ipecacuan. Callicocca Ipecacuanha. Cephaëlis Ipecacuanha. *Pentand. Monogyn. Aggregatæ*, Linn. *Rubiaceæ*, Juss. *Radix. South America.*

THE roots of different plants are met with in the shops under the name of Ipecacuan. That which is the most common and the most active is the grey or brown ipecacuan. It is the root of the Calicocca Ipecacuanha, or Cephaëlis Ipecacuanha of Wildenow, a low creeping plant which grows in Brazil. This kind is in small twisted ramifications, annulated, of a brown colour, having a faint smell more obvious in the powder, and a bitter slightly acrid taste. Its emetic power is injured by its being kept long exposed in the state of powder to the air and light.

The other plants affording roots known by this name are the Psychotria emetica, a plant of Carthagena, of which the root is black, and not annulated, and the Richardia Brasiliensis, which has a root annulated and white ; the former of these affords the black and the latter the white ipecacuan of commerce ; they are inferior in power to the root of the Cephaëlis Ipecacuanha, which is the only species recognised by the Colleges.

The principle on which the virtue of ipecacuan depends was discovered by Pelletier, from whom it received the name of Emetia. It is obtained in the form of a white powder, having a bitter and slightly acrid taste, soluble in alcohol and in water, uncrystallizable, and forming salts with acids. It is powerfully emetic, and has some degree of narcotic power.* It exists in the bark of the root in a proportion of 16 *per cent.*; the other constituents of ipecacuan are chiefly gum, starch and lignin. The root of the psychotria and that of the richardia contain smaller proportions of emetia.

Ipecacuan is the mildest of those emetics which are at the same time sufficiently certain in their operation ; and the acquisition of it has been an advantage in modern practice. It evacuates the contents of the stomach without exciting violent vomiting, or extending its action beyond this organ ; it is hence adapted to cases where an excess of effect would be prejudicial ; and as a mere evacuant, is preferable to every other emetic. The mildness and certainty of its operation render it also the emetic best adapted for children. The medium dose of it as an emetic is 15 grains to an adult, though 20 or 30 may be taken with perfect safety, as it only operates more speedily ; and a full dose is even preferable to a smaller one, as

* The impure or coloured emetia is that which is generally used. As an emetic this may be administered in doses of four or five grains dissolved in a couple of ounces of water.—B.

more certain, and producing less nausea. The officinal infusion of it in white wine acts as an emetic in the dose of an ounce. Though principally employed as an emetic, ipecacuan is occasionally prescribed with other views. It was originally introduced as a remedy in dysentery, given either in such a dose as to produce full vomiting, or in the quantity of two or three grains repeated every three or four hours, till it occasioned vomiting, diaphoresis, or purging. It has been given in a similar mode in obstinate diarrhœa. In spasmodic asthma it is exhibited in a full dose to relieve the paroxysm; and in a dose of 3 or 4 grains, continued every morning for some weeks, to prevent its recurrence. A singular idiosyncrasy has been observed in some individuals with regard to it, difficulty of breathing being induced by the effluvia arising from it in powder, especially when it is diffused in the air. In hæmorrhagies it is given in nauseating doses, the nausea diminishing the force of the circulation. Combined with opium, it forms a very powerful sudorific.*

*Offic. Prep.*—P. ipecac. et opii. Vin. ipecac.

SCILLA MARITIMA. Squill. *Hexand. Monog. Liliaceæ*, Linn. Juss. *Radix.*

SQUILL is the bulbous root of a plant which grows on the sandy shores of Spain and Italy. It is pear shaped, and consists of concentrate layers easily separable, each covered with a thin membrane, of a white or purplish colour. It has little smell; its taste is bitter and acrid, and it is capable of inflaming the skin; its acrimony is lessened by drying; but its bitterness and active powers as a medicine are little impaired. Its active matter is extracted by water, alcohol, and vinegar. The latter is the solvent commonly employed, as it best covers its nauseous taste, and does not appear to injure its powers.

From an analysis of M. Vogel, its virtues seem to reside in an acrid principle which he calls Scillitin. He states the proportions of its constituents as follows:—Gum, 6. scillitin, 35. tannin, 24. woody fibre, 30. with some traces of citrate of lime and sugar. Scillitin is white and transparent, with a resinous fracture; taste very acrid. It is insoluble in water.

Squill, given in a sufficient dose, excites vomiting, though it is seldom used with that intention in substance. The vinegar of squill acts as an emetic in a dose of 2 or 3 drachms, as does the syrup when given in double that quantity; either of them is sometimes prescribed in pertussis; the syrup, in particular, from its sweetness, being easily given to children; and some advantage, it is supposed, being derived from the combination of its expectorant with its emetic power. The dose is a drachm to a child below five years of age, and its activity is promoted by the addition of a little ipecacuan wine. This root is, however, much more used as a diuretic and expectorant; uses of it which are afterwards to be noticed.†

* *Incompatible Substances.* Vegetable astringents, as the infusion of galls, iodine, and acetate of lead. All these throw down the emetia.—B.

† *Incompatible Substances.* Salts of lead and iron, sulphuric acid, tartar emetic, and gelatin.—B.

*Offic. Prep.*—Acet. scill. Pil. scill. Tinct. scill. Syr. scill.

ANTHEMIS NOBILIS. Chamomile.

ALL bitter drugs are liable to excite nausea or vomiting. Chamomile has perhaps more peculiarly this effect; a strong infusion of the dried flowers in warm water excites vomiting, and a weaker infusion is often employed to quicken the action of ipecacuan or other emetics, a draught of it being taken instead of tepid water.

SINAPIS ALBA ET NIGRA. Mustard. *Tetradyn. Siliq. Siliquosæ,* Linn. *Cruciferæ,* Juss. *Semina. Indigenous.*

THE seeds of mustard have a considerable degree of acrimony and pungency, which is apparent when they are bruised. This has been supposed, but without much certainty, to reside in an essential oil. They yield a portion of mild oil by expression, and the acrid matter remains with the starch, which is the base of the seed.

The powder of the mustard seed, given in the dose of a large teaspoonful mixed with water, operates as an emetic. From its stimulant quality, it has been recommended in preference to other emetics in apoplexy and paralytic affections, and in such cases has sometimes been found to excite vomiting when these had failed. It is convenient also as an auxiliary, when the dose of an emetic has not operated, a little of the powder of mustard being taken diffused in tepid water. The seeds unbruised are sometimes swallowed in the dose of half an ounce or an ounce, as affording a stimulant in chronic rheumatism and amenorrhœa. The flower of mustard is applied externally as a rubefacient and vesicatory.

*Offic. Prep.*—Catap. sinapeos.

ASARUM EUROPÆUM. Asarabacca. *Dodecand. Monogyn. Sarmentaceæ,* Linn. *Aristolochiæ,* Juss. *Folia. Indigenous.*

THE leaves and root of this vegetable, prior to the introduction of ipecacuan, were frequently employed on account of their emetic quality; the dose of the dried leaves was 20 grains; of the dried root, 10 grains. As they were occasionally violent in their operation, and at the same time uncertain, they have fallen into disuse. The plant is still retained in the Materia Medica as an errhine.

NICOTIANA TABACUM. Tobacco.

THE leaves of this plant, in a person unaccustomed to their use, by chewing or smoking, excite, even in a small dose, severe and permanent nausea and vomiting. The same effects have followed from their external application to the region of the stomach; and this method of exciting vomiting has been proposed in cases where emetics cannot be easily administered by the mouth. Tobacco is also sometimes taken under the form of infusion as an emetic, but its operation is always harsh, and accompanied with severe sickness.

[LOBELIA INFLATA. Indian Tobacco.—Emetic Weed. *Pentand. Monogyn.* Nat. Ord. *Campanaceæ. United States. Herba.*

This plant is to be found in every part of the United States, and flowers in the months of June and August. Its taste is acrid, resembling very much that of tobacco. It yields its virtues both to water and alcohol. According to analysis, it contains an acrid principle, caoutchouc, extractive. Its effects upon the human system are different according to the doses in which it is given. Taken in large quantities, it has been known to be succeeded by consequences the most violent, and even fatal. As it bears a close affinity in its general operation to tobacco, its administration should therefore be subjected to the same cautions which are found necessary in the use of this latter article. In suitable doses the Lobelia acts as an antispasmodic, emetic, expectorant, and diaphoretic. In the treatment of asthma, its virtues have received the highest commendation. The Rev. Dr. Cutler, to whom we are indebted for our earliest information on this subject, used it in his own case, with the most decided success, and his reports concerning it have been confirmed by subsequent observations. By Dr. Eberle it has been administered with success in croup, as also in a case of strangulated hernia, in the form of enema. In the hands of Dr. Barton it has proved successful in hooping cough, and in general it is recommended as a valuable expectorant in catarrh, and in coughs depending upon an accumulation of fluids in the bronchial vessels.

The proper season for collecting the plant is the month of August. The whole plant should be taken up by the roots and then dried. It may be given in substance from 10 to 30 grains, as an emetic for an adult. To prove expectorant it must be administered in small repeated doses. The best preparation is the tincture, which may be made either from the recent or dried plant. The former is supposed to be the most active. In the Pharmacopœia of the United States, it is prepared by digesting for ten days ℥ij of the plant in one pint of diluted alcohol. The dose is from ʒi to ʒiv, according to the effects intended to be produced.—B.]

[Euphorbia ipecacuanha. American Ipecacuanha. Spurge. *Dodecand. Trigyn.* Nat. Ord. *Tricoccæ. United States. Radix.*

This species of the Euphorbia is peculiar to the United States, and is found in loose sandy soils along the sea-coast from New-Jersey to Georgia. It flowers in May. The root, which is used in medicine, is perennial, and has a sweetish and not unpleasant taste. According to analysis it contains caoutchouc, resin, mucus, and probably fecula. As an emetic the American Ipecacuanha stands exceedingly high with those who have made the most extensive trials of its virtues. Dr. Barton eulogizes it as abundantly competent to supersede the common ipecacuanha of the shops. In some respects he considers it even superior. It may be used in every case in which the foreign ipecacuanha is indicated. The dose is from 15 to 20 grains. —B.]

[Spiræa trifoliata. Indian Physic. Ipecacuanha. Beaumont Root. *Icosand. Pentagyn.* Nat. Ord. *Lenticosæ. United States. Radix.*

This plant flourishes in all parts of this country, and is found resident in shady woods on mountains and hills. The root is the only part used in medicine. It has a bitter taste, and on analysis yields large proportions of extractive matter and resin. As an emetic the spiræa enjoys the reputation of possessing properties nearly equal to those of the ipecacuanha. The dose is xxx grs. in powder. The proper period for gathering the root is September.—B.]

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# CHAP. VII.

## OF CATHARTICS.

Cathartics are those medicines which quicken or increase the evacuation from the intestines ; or which, when given in a certain dose, produce purging. They are medicines of importance, but differ from each other very considerably in their powers.

Cathartics evidently act by stimulating the intestines so as to increase the natural peristaltic motion, and thus cause their contents to be more quickly propelled and evacuated. The greater number of them have, however, a farther effect. They stimulate the extremities of the exhalant vessels, terminating on the inner surface of the intestines : they thus cause a larger portion of fluid to be poured out, and hence the evacuations are more copious, and of a thinner consistence. Some cathartics have this power of increasing the effusion of fluids from the exhalants much more than others ; such, for instance, are the Saline Purgatives. Dr. Cullen has even supposed that some may act solely in this way, and without increasing directly the peristaltic motion. There is, however, no proof of this ; and it seems scarcely probable that a substance should act as a stimulant on these vessels, without at the same time stimulating the moving fibres of the intestines. Some seem to produce the latter effect with scarcely any of the former ; such are aloes and rhubarb ; hence they merely increase the natural discharge.

The action of cathartics is not confined to the parts to which they are directly applied. Their stimulus is extended to the neighbouring organs, probably by sympathetic communication, and hence they promote the secretion, and increase the discharge of the bile and other fluids poured into the intestinal canal. These effects are produced in very different degrees by different cathartics ; and there seems some reason for admitting an opinion adopted by the ancients, that certain cathartics have peculiar powers in this respect ; some, for instance, having the power more particularly of promoting the discharge of bile, others that of the mucus of the intestines, or of the serum ; it is not improbable, as Darwin imagined, that the pancreas and spleen may be peculiarly stimulated into action by others of this class of medicines : and the action

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of some of them has also been supposed to extend to the uterine system.

There is likewise a difference in cathartics with respect to the parts of the intestinal canal on which they act. Some, as the saline purgatives, seem to increase its peristaltic motion through its whole length; others, as aloes, have their action confined to the lower intestines.

Lastly, it is to be observed, that the action of many cathartics is extended even to the stomach; its peristaltic motion is increased, either from association with the motion of the intestinal canal, or from the direct stimulant action of the cathartic applied, and its contents are therefore more quickly discharged by the pylorus. From this cause, a full dose of a saline purgative will sometimes operate in half an hour after it is given.

There are several other differences between the medicines belonging to this class: some act slowly; others more quickly: some are liable to occasion nausea and griping, and in a large dose tenesmus; others, even when they operate effectually, are free from these disagreeable effects; some produce only one evacuation, others continue to act for a considerable time.

Besides the differences between particular cathartics, a general difference in their mode of operation has been supposed to exist, from which they have been classed under two divisions. Some operate mildly, without exciting any general affection of the system, without even stimulating perceptibly the vessels of the intestines, and hence they merely evacuate the contents of the canal. Others are more powerfully stimulant: they occasion an influx of fluids from the exhalant vessels and from the neighbouring secreting organs; they even extend their stimulant effect to the system in general; and, if taken in too large a dose, are liable to excite much irritation, and even inflammation on the surface of the intestines. The former are distinguished by the title of Laxatives, the latter are named Purgatives, and the stronger of them, Drastic Purgatives. The distinction is not altogether correct, since it refers merely to a difference in power; yet neither is it one to be altogether neglected.

From the indications which cathartics are capable of fulfilling, their utility in many cases of morbid affection must be obvious. In some general affections of the system, they procure a speedy, copious, and therefore useful depletion. And whenever there exists retention of the contents of the intestinal canal, where these contents are acrid, or where extraneous bodies are present, their evacuation, by the operation of a cathartic, is the obvious method of treatment.

The valuable observations of Dr. Hamilton have established still more clearly the importance of this class of remedies, have shewn that they admit of more extensive application, and have pointed out with more precision the principles which regulate their administration.

In many diseases there exists a state of the intestinal canal giving rise to retention of its contents, which is not to be obviated by the

occasional administration of a cathartic, but which requires a continuation of the operation short of that of purging, but producing evacuation while the contents are peculiarly offensive, or of an unnatural appearance, and until the healthy state of the bowels be restored. By this practice the cure of diseases has been accomplished, which, previous to Dr. Hamilton's publication, were treated by very different methods, and were not supposed to be so peculiarly connected with any state of the alvine evacuation.

Thus in fever, the peristaltic motion of the intestines is diminished, feculent matter is retained, and becomes a source of irritation: its evacuation, therefore, by the exhibition of purgatives, is clearly indicated, nor has this been altogether neglected. Physicians, however, were scarcely aware of the necessity of producing it to a sufficient extent; and in fevers of the typhoid type in particular, were frequently deterred from doing so by the fear of reducing the strength of the system by an evacuation considered as debilitating. Dr. Hamilton's observations establish the safety and propriety of the freer use of purgatives in fever, so as to produce complete and regular evacuation of the bowels through the whole progress of the disease; and the cases he has published afford striking proofs of the advantages derived from the practice. There are other forms of fever in which it is employed with equal advantage, and particularly so in scarlatina.

Several of the diseases comprehended under the class Neuroses appear to depend on, or to be very intimately connected with, a torpid state of the intestines, from which an accumulation of their contents takes place, proving a source of irritation that often affects the general system. Chorea is proved, by Dr. Hamilton's observations, to arise from this cause; and he has introduced with great success the mode of treatment, by the free use of purgatives, continued until the healthy state of the alvine evacuation has been established. The same practice, and with similar success, applies to hysteria, and, in Dr. Hamilton's opinion, to that species of tetanus, which, prevailing in warm climates and in warm seasons, appears to have its origin in disorders of the stomach and bowels. And ample evidence has established the success of the same treatment in the marasmus which attacks the young in both sexes, which is marked by loss of appetite, weakness, wasting of the body, and at length total prostration of strength. It is not less successful in chlorosis, and in that hæmatemesis to which females are liable between eighteen and thirty years of age. In some of these diseases, the quantity of matter accumulated in the intestines is extremely great; hence the extent to which the exhibition of purgatives must be carried, and the length of time during which they must be continued, much exceed what would be calculated on from the usual administration of remedies of this class: and the whole practice requires both decision and perseverance.

Analogies from some of these diseases lead to a similar exhibition of cathartics in other fevers, particularly in the bilious remitting fever of warm climates, in measles, erysipelas, and small-pox; likewise in scrofula, in dyspepsia, whether simple, or complicated with

hysterical or hypochondriacal mania; in cramp of the stomach, or of the extremities: in palpitation of the heart, and in those cases of hydrophobia which are not the effect of specific contagion. With regard to several of these, experience has established the soundness of the analogy.

In colic, and in ileus, the exhibition of cathartics is required, though there is considerable caution necessary in their application, to avoid such irritation as would excite or increase inflammation. In dysentery, similar advantages are derived from them, and still more caution is requisite to lessen the irritation they are liable to induce. The milder active purgatives are therefore employed.

Cathartics are farther employed with other intentions than merely to evacuate the intestinal canal. From the effusion of serous fluid which they occasion, by their stimulant action on the exhalant vessels, they are supposed to produce a diminution of fluids with regard to the whole body. This is in some measure an abstraction of the usual exciting powers acting on the system, and hence purging constitutes a part of what is named the Antiphlogistic Regimen, and is employed in inflammatory affections. By a similar operation it increases absorption. There exists a certain relation between the exhaling and absorbing powers, so that when the action of the one is increased, that of the other is augmented: the increased exhalation of serous fluid, therefore, into the intestines, which cathartics occasion, causes an increased absorption; and thus dropsy is sometimes cured by purging. It is evident that those cathartics which stimulate the exhalant vessels of the intestines are best calculated to fulfil this indication; hence saline purgatives are in general most serviceable in dropsy.

From the serous evacuation which cathartics occasion, from the derivation which they make from the head, and partly, no doubt, by removing a source of irritation, they are of utility in preventing and removing apoplexy; in all comatose affections, in mania, phrenitis, and the different species of headach.

Cathartics, especially the more powerful ones, require to be administered with caution even in diseases where they are indicated, when there is any tendency to inflammation or to extreme debility; also during pregnancy, immediately after delivery, during the flow of the menses, and in those liable to hæmorrhoidal affections. The too frequent use of them induces wasting of the body, and sometimes renders the intestines morbidly irritable, so that purging is easily excited, while in other habits it renders them more torpid, and induces costiveness. The saline cathartics have more peculiarly the former effect, and more quickly reduce the strength of the body, probably by the evacuation they occasion from the circulating mass.

Some cautions are requisite with respect to the mode of administering cathartics. Many of them are liable to excite nausea or vomiting,—effects which are prevented by giving them at intervals in repeated doses, or often by combining them with an aromatic. Such a combination also obviates the griping which they often occasion. The more acrid cathartics ought always to be given in divided doses: as in certain habits, even a small dose is liable to occasion unpleasant

symptoms. In general also, these acrid cathartics ought to be given rather in combination, as the effect is obtained with more certainty. Colocynth, or scammony, or any other drastic purgative, may fail if given alone in such a dose as it is proper to venture on; but if smaller doses of two or three of them be mixed, their operation is more certain and easy. Mercury always promotes the action of cathartics, and this effect is obtained not only by the internal exhibition of purgative mercurials, but by the introduction of mercury by friction; it is therefore a general effect, and is employed with peculiar advantage in obstinate constipation. Another advantage derived from the combination of cathartics is, that the more peculiar effect of each, whether it be evacuating the larger intestines, or stimulating the exhalant vessels, and causing the effusion of fluid, is prevented, and the general effect, exclusive of these peculiarities, is better obtained. They irritate less when given in a liquid form; in that form too they act more speedily than when given in a solid state; hence, when it is wished that a cathartic should operate slowly, it is best given in the form of pill, and at bed-time, as the state of diminished susceptibility in sleep retards the operation. In general, however, it is preferable to give the dose of a cathartic in the morning, as the operation of it is less troublesome to the patient. Dr. Hamilton has pointed out the common error in the exhibition of cathartics, that of their not being given to the requisite extent; and has given the general rule in all morbid affections, of repeating, and, if necessary, enlarging the dose while the evacuations are peculiarly offensive, or of an unnatural appearance, without however carrying their administration so far as to produce purging, unless this be the indication which is designed to be fulfilled.

Cathartics may be arranged in some measure according to their power, placing those first which operate mildly, and which have usually been denominated Laxatives, and proceeding to those which are more powerful, and have other effects than merely evacuating the contents of the canal. The saline Cathartics may be placed under the latter division, though their operation, as has been already explained, is sometimes peculiar. To this may be added, those substances which act as cathartics under the form of Enema.

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## CATHARTICS.

### A.—LAXATIVES.

MANNA.
CASSIA FISTULA.
TAMARINDUS INDICA.
RICINUS COMMUNIS.
SULPHUR.
MAGNESIA.
CARBONAS MAGNESIÆ.

## B.—PURGATIVES.

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| Cassia senna. | Oleum terebinthinæ. |
| Rheum palmatum. | Submurias hydrargyri. |
| Convolvulus jalapa. | Sulphas magnesiæ. |
| Helleborus niger. | Sulphas sodæ. |
| Croton tiglium. | Sulphas potassæ. |
| Cucumis colocynthis. | Super-tartras potassæ. |
| Momordica elaterium. | Tartras potassæ. |
| Rhamnus catharticus. | Tartras potassæ et sodæ. |
| Aloe. | Phosphas sodæ. |
| Convolvulus scammonia. | Murias sodæ. |
| Stalagmitis cambogioides. | |
| Terebinthina veneta. | [Podophyllum peltatum.—B.] |
| Nicotiana tabacum. | [Carbo ligni.—B.] |
| [Juglans cinerea.—B.] | |

### LAXATIVES.

Manna. Manna. Fraxinus Ornus. Fraxinus Rotundifolia. *Polygam. Diœc. Jasmineæ,* Juss. *Succus concretus. South of Europe.*

This substance, though afforded by several vegetables, is usually obtained from different species of the ash-tree, particularly those mentioned above, which are cultivated in Sicily and Calabria. It is procured by spontaneous exudation, but more copiously by incisions made in the bark of the trunk. The juice, which exudes, soon becomes concrete. When it exudes slowly, the manna is more dry and white, and of a texture somewhat granulated; it is collected in chips of wood or straw, and forms what is named Flake Manna. When the exudation is more copious, the juice is of a darker colour, and concretes into a soft mass, less pure than the other, and composed of fragments of a grey and white colour intermixed.

Manna used to be regarded as a species of sugar, but, according to Dr. Prout, consists chiefly of a principle named Mannite, which differs from sugar in not being susceptible of fermentation. Manna has a sweet and somewhat unpleasant taste; in most of its properties it resembles sugar. In its unrefined state sugar proves laxative, but manna does so in a greater degree. Its dose is from one to two ounces to an adult.

Though mild in its operation, it is apt occasionally to produce flatulence and griping, and hence it is principally used in combination with other cathartics, particularly with senna, the bitter taste of which it covers. This combination is in common use as a purgative to children.

Cassia fistula. Purging Cassia. *Decand. Monog. Lomentaceæ,* Linn. *Leguminosæ,* Juss. *Pulpa Fructus. Egypt, East and West Indies.*

The fruit of this tree is in cylindrical pods, nearly an inch in dia-

meter, and ten or twelve inches in length. The external membranous part is firm and hard; it is divided within by septa, between which the seeds are inclosed, imbedded in a soft pulp. The pulp is of a black colour, and has a sweet taste, with a slight degree of acidity. It is extracted by boiling the bruised pods in water, and evaporating the decoction. It is soluble in water, and partly soluble in alcohol. According to Vauquelin's analysis of it, it consists of sugar, gum, tannin and gluten.

The pulp of cassia proves laxative in a dose of four or six drachms; in a large dose necessary to occasion purging it is apt to induce nausea or griping, and even as a laxative it has no particular advantage. The sole consumption of it is in the composition of the officinal preparation, the Senna Electuary. There is another electuary in the Pharmacopœias, to which, as being the principal ingredient, it gives its name, in which it is combined with manna and pulp of tamarinds; but this is never used.

*Offic. Prep.*—Elect. cass. Conf. cass.

TAMARINDUS INDICA. Tamarind. *Monadelph. Triand. Lomentaceæ,* Linn. *Leguminosæ,* Juss. *Fructus conditus. East and West Indies.*

THE pod of this tree includes several large hard seeds, with a brown viscid pulp, very acid. The pulp, mixed with the seeds and small fibres, and with a quantity of unrefined sugar added to preserve it, forms the Tamarinds of the shops, the preparation of them being performed in the West Indies, by freeing the pod from its external covering, and pouring on the pulp and seeds a strong syrup hot, so that on cooling it becomes nearly concrete. Vauquelin found sixteen ounces of this prepared pulp to contain, besides the sugar mixed with it, an ounce and a half of citric acid, two drachms of tartaric acid, half an ounce of bitartrate of potash, half a drachm of malic acid, jelly, mucilage, and fibrous matter.

The pulp of tamarinds, besides being from its acid useful as a refrigerant, proves laxative when taken to the extent of an ounce, but is too weak to be employed alone. It is generally added to other cathartics, which are given in the form of infusion, with the view of promoting their operation, or of covering their taste. It is an ingredient in the Electuarium Sennæ, and there is an officinal infusion of it with senna, which affords a very pleasant purgative.

There are some other sweet fruits which have a laxative quality, as the Fig (Ficus Carica,) and the Prune, or dried plum (Prunus Domestica). These are sometimes used in domestic practice, and they are also ingredients in the Electuary of Senna. The Raisin, or dried Grape, (Vitis Vinifera,) is also laxative in a slight degree.

RICINUS COMMUNIS. Palma Christi. Castor Oil Plant. *Monœc. Monadelph. Tricoccæ,* Linn. *Euphorbiaceæ,* Juss. *Oleum, Semina. West Indies.*

THE seeds of the capsules of this plant consist chiefly of vegetable albumen, with a considerable quantity of unctuous matter intermixed. They afford, by expression or by decoction, an oil, which

is used in medicine in this country under the name of Castor Oil. When obtained by decoction of the bruised seeds in water, it is purer and less acrimonious than when obtained by expression, if the heat be not raised too high, or continued too long. The oil is of a yellowish colour, transparent, viscid, and has scarcely any peculiar taste or smell; it has the general properties of expressed oil; but what is singular, it is soluble in alcohol: it is also soluble in sulphuric ether. It, and the oil of Croton, are the only examples of expressed oils having any medical activity.

As a laxative, castor oil acts mildly, and, at the same time, very effectually; it also operates in a shorter time than almost any other cathartic. Possessed of such advantages, it is frequently employed; and is more peculiarly adapted for exhibition, where any degree of irritation is to be avoided; hence its use in colic, constipation, hæmorrhoids, and as a purge during pregnancy. Its dose is one ounce. It is taken floating on peppermint-water, mixed with any spiritous liquor, or any purgative tincture, as that of senna; or diffused in water by the medium of gum, sugar, or the yolk of an egg.

From the Mineral Kingdom two laxatives are derived, Sulphur and Magnesia.

SULPHUR is a simple inflammable, found in nature nearly pure, and likewise in combination with several of the metals. The greater part of the sulphur of commerce is the produce of volcanic countries. It is naturally mixed with earthy matter, from which it is freed by sublimation, forming the Sulphur Sublimatum, Flores Sulphuris, or Flowers of Sulphur. When melted and run into cylindrical moulds, it forms Roll Sulphur, which is usually less pure.

Sulphur, in its solid state, is brittle and hard, but it is capable of assuming a crystalline form; it is generally used in the state of the loose powder in which it is obtained by the process of sublimation conducted on a large scale. It is of a light yellow colour; is insipid, or slightly sour from a small portion of acid adhering to it; it has a faint smell when rubbed or heated; is fusible and volatile; and when heated in atmospheric air, burns with a blue flame, and the production of suffocating fumes. It is insoluble in water or alcohol, but is dissolved by oils.

Sulphur, in a dose of 2 or 3 drachms, acts as a laxative, and so mildly, that it is often used in hæmorrhoidal affections, and other cases where, though the operation of a purgative is indicated, any irritation would be injurious. It likewise passes off by the skin, and is hence administered internally, as well as applied externally in psora. In this disease it may be regarded as a specific. In habitual dyspnœa and in chronic catarrh, advantage has been derived from it, partly from its action as a laxative, and partly as a diaphoretic. Sulphur is best given in the form of electuary. The purification of sulphur by washing is ordered in the Pharmacopœias, but is a process unnecessary. Precipitated by an acid from its solution by an alkali or lime, it is obtained of a whiter colour than in its usual state, and this precipitated sulphur is used in preference to the sublimed sulphur in forming ointments.

*Offic. Prep.*—Sulph. sublim. Sulph. potass. Sulphur. lotum. Ol. sulph. Ung. sulph. Sulph. præcip.

MAGNESIA. Magnesia. Carbonas Magnesiæ.—This earth is not found pure in nature, but exists abundantly combined with certain acids, and from these saline combinations, particularly from the sulphate and muriate extracted from sea-water, it is obtained by processes to be afterwards noticed, either pure, or in the state of carbonate. In either state it is used as an antacid and laxative, in a dose of a drachm or more. Its laxative effect is generally considered as owing to its forming with the acid in the stomach a saline combination, which, like its other salts, is purgative, though, as it usually produces this effect, it probably has itself a weak cathartic quality. From being insipid and mild, it is well adapted for exhibition to infants.*

### PURGATIVES.

CASSIA SENNA. Senna. *Decand. Monog. Lomentaceæ*, Linn. *Leguminosæ*, Juss. *Folia. Egypt, Arabia.*

THE dried leaves of this plant are of a yellowish-green colour, have a faint smell, and a bitter taste. The active principle of senna, according to the experiments of Lassaigne and Fenuelle, is a solid matter of a reddish-yellow colour, soluble in alcohol and water, and having a very bitter nauseous taste. It has been named Cathartine. By decoction with water its strength is impaired.

Senna is a purgative very frequently employed, having a considerable degree of activity, without being liable to be harsh in its operation. It is usually given in the form of the watery infusion, 2 drachms being infused in 4 or 6 ounces of tepid water, generally with the addition of a few coriander seeds, or a little ginger, to cover its flavour, and obviate griping, which it has rather a tendency to produce. It is also frequently combined with manna, with tamarinds, or with super-tartrate of potash; and as its taste can be covered with sugar or manna, it is a purgative generally given to children. There is an officinal tincture of it which operates as a purgative in the dose of an ounce; there are also officinal infusions of it; and it enters into the composition of several other preparations employed as cathartics. Decoction renders senna inert.†

*Offic. Prep.*—Tinct. sen. Syr. sen. Conf. sen. Pulvis sen. Inf. sen. Ext. sen. Elect. sen. Inf. sen. cum tamar.

RHEUM PALMATUM. Rhubarb. *Enneand. Trigyn. Oleraceæ*, Linn. *Polygoneæ*, Juss. *Radix. Tartary.*

IT is yet uncertain what plant the rhubarb of commerce is obtained from. Three species have been named, to each of which it has been referred, the Rheum palmatum, R. undulatum, and R. com-

* *Incompatible Substances.* Acids, and acidulous and metallic salts, muriate of ammonia, and lime water.—B.

† *Incompatible Substances.* Strong acids, lime water, and most metallic salts.—B.

pactum. They have been naturalized in this country, and rhubarb of good quality prepared from them, yet it is doubtful whether the Russian or Turkey rhubarb, which is of a superior quality, be derived from any of these.

The best rhubarb is named Russian or Turkey, from its coming to us through these countries; it is the produce of Chinese Tartary; is in small pieces, with a large hole in the middle, this perforation having been made in the recent root to admit of its drying more quickly; it is of a lively yellow colour, with streaks of white and red; has a smell peculiar, and somewhat aromatic, and a bitter slightly astringent taste. Another kind is imported from China, and is known in the shops by the name of Indian rhubarb; it is in large masses, more compact and hard, heavier, and less friable, and less fine in the grain than the other, and having less of an aromatic flavour. It also comes from Tartary, but less care seems to be bestowed on its cultivation and preparation.

Rhubarb affords on analysis resin, starch, lignin, gum, malate and phosphate of lime, a peculiar yellow coloured crystallizable principle, to which Pfaff gave the name of Rhabarbarine, and another principle, orange coloured and slightly bitter, named Rhein, by M. Vaudin. Rhabarbarine forms yellow salts with acids; the sulphate has been introduced into practice, and is said to possess the medicinal powers of rhubarb in a concentrated form, and to act with such uniformity, that the dose may be adapted to infants. Some chemists affirm, that rhubarb contains a large proportion of oxalate of lime, but this is denied by others. Rhubarb is a useful purgative; it combines astringency with a cathartic power. The watery infusion is said to be more purgative than the spiritous, and, by applying heat to the rhubarb in substance, its purgative quality is lessened, while its astringency remains. The Chinese rhubarb is supposed to be more astringent than the Turkey.

The dose of rhubarb, as a cathartic, is one scruple or half a drachm. A dose such as this appears to be necessary to produce the full purgative effect; but a much smaller quantity, that of a few grains, is sufficient to excite the action of the intestines, so as to produce increase of the natural evacuation; and it is with this last intention, perhaps, that it is most properly employed. It is useful in this mode in dyspepsia, hypochrondiasis, jaundice, and some similar affections, obviating the costiveness which frequently attends them, and farther, by its operation as a bitter, contributing to restore the tone of the digestive organs. From its astringent property it is considered as peculiarly adapted for exhibition in diarrhœa, any acrid matter being evacuated by its purgative effect before it acts as an astringent. It farther enters into a number of officinal preparations, in which it is either the principal medicine, or combined with aloes, which bears a considerable resemblance to it in its modes of operation, with bitters or aromatics.

*Offic. Prep.*—Inf. rhei. Tinct. rhei. T. rhei comp. T. rhei cum aloe. T. rhei et gent. Vin. rhei. Ext. rhei. Pil. rhei.

Convolvulus jalapa. Jalap. *Pentand. Monog. Campanaceæ*, Linn. *Convolvulaceæ*, Juss. *Radix. Mexico.*

The dried root of jalap is imported in thin transverse slices or in round masses; it is solid, hard, and heavy; of a dark grey colour, and striated texture. It has little smell; its taste is bitter and subacrid.

Jalap contains a resinous and a gummy matter, its purgative quality appearing to reside in the former, as it is extracted by alcohol, while its watery infusion is comparatively inert, or only acts as a diuretic. Proof-spirit is its proper menstruum. Mr. Hume has applied the name of Jalapine to a peculiar principle, which he obtained from jalap in the state of a white powder. It forms little more than one *per cent.* of jalap.

This root is an active purgative, producing full evacuation from the intestines; sometimes occasioning, however, nausea or griping. Its medium dose is half a drachm. Besides being given alone, it is very frequently used to quicken the action of other cathartics, of calomel, for example; or it is combined with others, which are supposed to render it less stimulating, as with the super-tartrate of potash: This latter combination is in common use as a hydragogue cathartic; the former, that of jalap and calomel, affords a very safe active purgative, which is employed where it is difficult to excite the action of the intestinal canal. Jalap operates most mildly and effectually in substance, and is therefore seldom given under any form of preparation. The resin of jalap is much used on the continent as a cathartic, but it is more harsh in its operation than when the gum is in combination with it.

*Offic. Prep.*—T. Jalap. Ext. jalap. Pul. jal.

Helleborus niger. Melampodium. Black Hellebore. *Polyand. Polygyn. Multisiliquæ*, Linn. *Ranunculaceæ*, Juss. *Radix. Austria, Italy.*

The root of this plant consists of short articulated fibres attached to one head, externally dark-coloured, internally white. Its taste is very acrid, but the acrimony is much impaired by drying and by age. Its active power seems principally to reside in an oil obtained by digesting the root in alcohol, also in its resinous part, which alcohol dissolves, the tincture affording, by evaporation, a very active extract. By decoction with water it yields half its weight of gummy matter, with some resin. Its distilled water, it is affirmed, is acrid, and even cathartic.

Black hellebore root is a very powerful cathartic in a dose of a few grains; so violent, indeed, and at the same time uncertain in its operation, that it is scarcely ever used in substance; the watery extract of it, which is milder, has sometimes been employed. On its cathartic power probably depends any advantage that may be derived from its administration in mania and melancholia, in which diseases it was highly celebrated by the ancients. In dropsy it has been employed as a hydragogue cathartic, principally under the form of the spiritous extract.

*Offic. Prep.*—Tinct. helleb. Ext. helleb.

Croton tiglium. *Monœc. Monadelph. Tricoccæ,* Linn. *Euphorbiaceæ,* Juss. *Semina. Molucca Islands.*

The Croton Tiglium is a native of the Molucca Islands, and from its seeds an expressed oil is obtained, having a very hot and acrid taste, and leaving a disagreeable sensation in the mouth and fauces, which lasts for several hours. It is a very powerful purgative, and its seeds were formerly known in Europe under the name of Molucca Grains, but were discarded from practice on account of their very drastic operation; the oil which they contain, however, is now very frequently employed. It is soluble in ether, oil of turpentine, and alcohol; but the solution which the latter effects is only partial, about a third part remaining undissolved, which is quite inert. According to Dr. Nimmo, 100 parts of croton oil consist of 45 parts of an acrid purgative principle,* and 55 of a fixed oil similar to olive oil.

The use of the oil of croton has been attended with great advantage in cases where it is of importance to obtain a speedy and full evacuation of the intestinal canal, as in apoplexy, mania, and long-continued constipation. From the smallness of the dose too in which it acts, namely, a drop or two, it can be given to patients in a state of insensibility, or who obstinately refuse medicine. As so very small quantity of it is required to evacuate the intestines, it ought to be given with great caution, and it seems, from the occasional virulence of its action, more particularly adapted to people of a robust constitution. Cases have occurred where it has been attended with hypercatharsis, and even with hæmatemesis.

Dr. Nimmo recommends it to be given in the form of the saturated alcoholic solution, rubbed up with two ounces of syrup, and two ounces of mucilage, and four ounces of distilled water.† It may also be given in the form of pills made with crumbs, or a drop or two may be added to a drachm of castor oil. M. Caventou has proposed to make it into a soap with soda to moderate its action, and enable the dose to be apportioned, but all these methods lessen its chief advantage, the smallness of the quantity required for a dose.

Cucumis colocynthis. Colocynth. Bitter Cucumber. *Monœc. Syngenes. Cucurbitaceæ,* Linn. Juss. *Fructus Pulpa. Syria.*

The part of this plant used in medicine is the dried medullary substance of the fruit. It is white, soft, and porous; the seeds mixed with it are comparatively inert. Its taste is intensely bitter. Boiled in water, it gives out a large portion of mucilage, so as to form a liquor of a gelatinous consistence. This is less active than colocynth itself. Alcohol also dissolves only part of its active matter; when its alcoholic solution is evaporated, a golden yellow substance is ob-

* Dr. Paris considers this a peculiar principle, and proposes to give to it the name of *Tiglin.*—B.

† The formula of Dr. Nimmo is as follows:—℞. Alcoholic solution, (made in the proportion of ʒj of rectified spirit, to two drops of the oil), ʒss Syrupi simp:—Mucilag. Gum Arab. āā ʒij aq. distillat. ℥ss ft. haustus. After swallowing a little milk, the draught is to be taken very quickly, and washed down with repeated quantities of the same diluent.—B.

tained, which Vauquelin named Colocyntine, and regarded as the active principle of this plant.

Colocynth is one of the most drastic purgatives, so much so that its operation is not easily regulated. Its dose is from three to six grains; but it is so liable to occasion griping, tenesmus, and other symptoms, that it is scarcely ever given by itself, being rather used to promote the operation of other cathartics. Combinations of it with jalap, aloes, or mild muriate of mercury, are thus given in obstinate constipation, in mania, and coma; and in these combinations it operates more mildly and more effectually than if given alone. Its infusion has been recommended as an anthelmintic.*

*Offic. Prep.*—Ext. colocynth. Ext. coloc. comp.

Momordica elaterium. Wild Cucumber. *Monœc. Syngenes. Cucurbitaceæ*, Linn. Juss. *Fecula Fructus. South of Europe.*

The expressed juice of the Wild Cucumber deposites a yellowish substance, which, when dried, is known by the name of Elaterium. It is a very powerful cathartic, and from the violence of its operation has been ventured to be exhibited only in the most obstinate cases. Its dose is half a grain, repeated every second or third hour till it operate. As a drastic purgative, it has sometimes been given in mania, and as a hydragogue cathartic in dropsy; and, according to Dr. Ferriar, it has succeeded in hydrothorax, after all other remedies had failed.

The principal objection to the employment of this powerful medicine is the uncertainty of its action. It has been given to the extent of ten grains with scarcely any effect upon the intestinal canal; and, in other cases, the small dose of half a grain has acted as a most powerful cathartic. The reason of this diversity of its effects has been shewn by Dr. Clutterbuck to arise from the elaterium not being prepared, as it should be, from the fruit alone. He ascertained that the active principle resided almost exclusively in the juice around the seeds. This juice, he states, is perfectly colourless, and limpid when it first exudes; but after some time it assumes a turbid appearance, and deposites a sediment of a yellowish-white colour. This is the real elaterium, and when dry it is light and pulverulent. Its taste is acrid; it is insoluble in water, and appears, from its solubility in alcohol, to be of a resinous nature: one eighth of a grain acts powerfully as a cathartic. Dr. Paris discovered in elaterium a principle which he named Elatin; it exists in elaterium in the proportion of one part in ten; it forms a bright green solution with alcohol, from which it is precipitated by the addition of water; it operates as a purgative in very small doses. The continental physicians reject the sediment from the juice of the wild cucumber, and use the juice inspissated after the sediment is removed; this is much weaker as a purgative, and is given in larger doses than would be safe with elaterium.

*Offic. Prep.*—Extract elater.

* *Incompatible Substances.* Acetate of lead, sulphate of iron, and fixed alkalies.—B.

RHAMNUS CATHARTICUS. Buckthorn. *Pentand. Monogyn. Dumosæ*, Linn. *Rhamneæ*, Juss. *Baccarum Succus. Indigenous.*

THE berries of this vegetable are very succulent; the juice they afford by expression has a cathartic power. Made into a syrup by boiling with sugar, (Syr. rham.,) it operates in a dose of an ounce. It is liable, however, to occasion thirst and griping, and is therefore seldom used.

ALOE. Aloe Socotorina. —SPICATA. ALOE HEPATICA. —Barbadensis. —vulgaris. Socotorine or Spiked Aloes. Hepatic or Barbadoes Aloes. *Hexand. Monogyn. Liliaceæ*, Linn. Juss. *Succus spissatus. Africa, Asia, America.*

ALOES is a concrete resinous juice, of which several varieties are met with in the shops, differing in purity and in their sensible qualities. Two kinds are particularly to be noticed. The first and purest is the Socotorine Aloes, originally brought from the African island of Socotora. According to De Candolle, it is the juice of the Aloe Socotorina, a plant growing not only in that island, but along the south-eastern coast of Africa, and particularly in the kingdom of Melinda, whence the greater part of the aloes sold under this name is brought. But the London and Dublin Colleges refer this kind of aloes to the Aloe Spicata, which grows at the Cape of Good Hope. It is probably derived from both. The expressed juice of the leaves of this plant is inspissated by exposure to the air and sun, and when dried forms the socotorine aloes. It is imported in small pieces of a reddish-brown colour, nearly black in the mass; when reduced to powder it is yellow.

The other kind of aloes, named the Hepatic or Barbadoes aloes, is obtained from the Aloe vulgaris of De Candolle. This plant is indigenous in the south of Europe, and is supposed to have afforded aloes to the ancients. It is indigenous also in Brazil and the West Indies, and is extensively cultivated in Barbadoes to afford this drug. The whole plant is taken, cut in pieces and boiled in water. The liquor is evaporated to the consistence of honey, and is run into large gourd shells, in which it becomes concrete. The Barbadoes aloes is of a lighter colour than the socotorine, and has an odour stronger and more unpleasant. Another kind of aloes, named the Caballine, is also procured from the Aloe vulgaris; it is more impure and fetid than the others, and is weaker in its power.

The taste of all the kinds of aloes is intensely bitter; their odour is disagreeable. They consist of bitter extract and resinous matter; the former is in larger quantity, and the medicinal properties of the aloes reside in it; the resin, obtained by the action of alcohol, has little smell or taste, and no purgative power. The bitter extractive matter has been named Aloesin by Pfaff. It is of a reddish-brown colour, when powdered of a golden yellow; water entirely dissolves it, hence the watery extract is more active than aloes itself. Long boiling alters it, so as to impair its activity, as is the case with regard to other vegetable cathartics.

Aloes, as a cathartic, has some peculiarities. It is slower in its operation than other purgatives; it merely evacuates the contents of

the intestines; and no greater effect is obtained from a large dose than from one comparatively moderate. These have been regarded as proofs, and perhaps justly, that its operation is principally on the larger intestines. Some have supposed its primary action to be on the liver. Its medium dose is from 5 to 10 grains, and its usual form of exhibition that of pill. As a purgative, it is employed to obviate habitual costiveness; and from operating simply as an evacuant, and without irritation, it is peculiarly adapted to this. Hence its use in hypochondriasis, in jaundice, and other cases attended with torpor of the intestinal canal. It is also often combined with other cathartics to produce more complete evacuation. From the supposition of its stimulant operation being particularly exerted on the rectum, it has been supposed to have a tendency to occasion hæmorrhoids,—an opinion for which there does not appear much foundation. On the supposition, too, of its stimulating effect being extended to the uterus, it has been regarded as a purgative to be avoided during pregnancy. On the same hypothesis, it has been supposed to act as an emmenagogue, and is not unfrequently used in amenorrhœa.

*Offic. Prep.*—Pil. aloet. Pil. al. et assafœt. Pil. aloes cum colocynth. Pil. aloes cum myrrh. Tinct. al. T. al. æther. T. al. cum myrrh. T. al. comp. Vin. al. Decoct. al. Ext. al. Pulv. al. comp. Pulv. al. cum canel.

Convolvulus scammonia. Scammony. *Pentand. Monogyn. Campanaceæ*, Linn. *Convolvulaceæ*, Juss. *Gummi-resina. Syria.*

Scammony is obtained by cutting the root of the plant obliquely, a few inches above the ground. A milky juice exudes, which is collected, and inspissated by exposure to the sun and air. It is in small fragments, of a blackish-grey colour, having little smell, and a bitter sub-acrid taste. It is, however, variable in its qualities, and is often adulterated by the intermixture of earthy matter. It is one of what are named Gum-resins, and consists of resin and gum, but the latter is in much the smaller proportion. Water dissolves about one-fourth of it; proof-spirit almost the whole, the impurities excepted.

Scammony is one of the drastic purgatives, and is employed chiefly where the less powerful substances of this class would fail. Its dose is from 5 to 10 grains, but it is generally combined in a smaller dose with other cathartics. It is also used as a hydragogue purgative in dropsy, combined usually with super-tartrate of potash; and it is employed as an anthelmintic cathartic, combined with jalap and calomel.

*Offic. Prep.*—Pulv. scam. Elect. scam. Conf. scam.

Gambogia. Gamboge. Stalagmitis Cambogioides. *Polygam. Monœc. Tricoccæ,* Linn. *Guttiferæ,* Juss. *Gummi-resina. India.*

Gamboge is an exudation from some plant, a native of Siam, but it is not absolutely certain what the species of plant is. It is believed, however, that the Stalagmitis Cambogioides, a tree of the natural order Guttiferæ, affords the gamboge of commerce. This gum-

resin is said to be obtained from incisions made in the branches and trunk of the tree. It is brittle, inflammable, of a lively yellow colour, and resinous fracture; has a taste bitter and acrid. Water and alcohol partially dissolve it, and its solution in alcohol becomes turbid on the addition of water; the alkalis also dissolve it. It affords one of the best examples of what is named a Gum-resin; the proportion of resin exceeds considerably that of gum, alcohol dissolving a much larger quantity of it than water does. According to Braconnot, it consists of four parts of resin and one of gum.

Gamboge is a very powerful cathartic, liable in large doses to excite vomiting, or to act with violence, and occasion profuse evacuation, with griping and tenesmus. Its medium dose is from 2 to 6 grains. It is seldom employed but in combination with some of the other powerful cathartics in obstinate constipation. It is also used to expel the tape-worm, and as a powerful hydragogue cathartic in dropsy. In the latter application of it it is usually combined with super-tartrate of potash. *Offic. Prep.*—Pil. cambog. comp.

Oleum terebinthinæ. Oil of Turpentine. *Pinus Sylvestris. Scotch Fir.*

This oil is procured by distillation from what is named Common Turpentine, the juice of the Pinus sylvestris, or Scotch fir. In France it is obtained from the juice of the Pinus maritima, or sea pine. It has of late advanced much in estimation as a remedy; its chief applications are as a cathartic, diuretic, anthelmintic, and stimulating external application. It has considerable power as a cathartic, and since Dr. Fenwick's discovery that it may be given with safety in large doses, is frequently used for this purpose. Dr. Mason Good recommends a dose of six drachms as the best aperient that can be employed in gout. Dr. Paris advises large doses of the oil to be used in obstinate constipation depending on affections of the brain. An ounce of oil of turpentine, rubbed with the yolks of two eggs, and diffused through a pint of thin starch, forms a useful enema.

Oil of turpentine possesses a degree of narcotic power along with its cathartic and diuretic effects. Thus, when a large dose of two or three ounces of it is taken to destroy tape-worm, it produces a degree of intoxication and stupor which continues for some hours. From this peculiar action on the brain it has been found of service in epilepsy. Dr. Latham gave a large dose at first, and kept up the narcotic effect by small doses. Dr. Perceval used smaller doses to the amount of several drachms in the day. It is, however, difficult to procure any permanent benefit from it in this disease. It has been given in large doses in sciatica, but with little benefit. In puerperal fever its administration, both internally and applied to the abdomen, has been employed with very great advantage. Dr. Montgomery informs us, that iritis may be successfully treated by oil of turpentine, given in drachm doses three times a-day. In enteritis, peritonitis, colic, purpura hæmorrhagica, chronic rheumatism, yellow fever, and for checking the hæmorrhage in dysentery, oil of turpentine is recommended by good authorities. It is best given triturated with honey or mucilage, and diffused through mint or cinna-

mon water, with the addition of a little brandy or tincture of capsicum; it is not very liable to be rejected by the stomach. Its dose as a diuretic is from 10 to 40 drops, as a cathartic from two drachms to an ounce, as an anthelmintic from one to three ounces. It may be combined with castor oil in the proportion of two or three drachms to half an ounce of the latter. Its external application shall be considered in the pharmaceutical part.

Sub-murias hydrargyri. Murias hydrargyri mitis. Calomelas. Mild Muriate of Mercury. Sub-muriate of Mercury. Calomel.

Nearly all the preparations of mercury have a purgative power, and peculiarly promote the action of other cathartics. This effect, as has been already stated, is even obtained when the general mercurial action is established, by the introduction of mercury by friction, and shews, therefore, a peculiar determination to the intestines. The cathartic power is more considerable, however, in the mild muriate than in the other mercurials, and it is in common use as a cathartic. It operates as such, when given alone in a dose of from five to ten grains, but with more certainty and power when its operation is promoted by the addition of a little jalap or rhubarb. One valuable quality which it has, is that of promoting the operation of other cathartics, without exciting any additional irritation, or rendering them liable to act with violence; it is therefore in obstinate cases of constipation, or where it is an object to procure full evacuation, combined with colocynth, scammony, or gamboge; and such a combination affords the safest of the powerful cathartics. Calomel also appears to be adapted to answer particular indications, from its action on the liver, and its powers of promoting the bile. Hence the advantage derived from it as a purgative in different forms of fever, particularly those of warm climates, and in chronic hepatitis.*

A division of Cathartics remains, intermediate in their operation between Laxatives and Purgatives, more powerful than the one, less acrid and stimulating than the other: these are the Compound Salts. They appear to act principally by stimulating the exhalant vessels on the internal surface of the intestines, so as to cause a larger proportion of serous fluid to be poured out, which dilutes the contents of the canal, and, by its operation, aided by the stimulus of the saline matter, accelerates the peristaltic motion. By the watery evacuation which they thus occasion from the general system, they are particularly adapted to those cases where inflammatory action, or tendency to it exists.

Sulphas magnesiæ. Sulphate of Magnesia.—This salt, formerly known by the name of Bitter Purging Salt, and Epsom Salt, is found in mineral waters, whence it used to be extracted, but is now principally obtained from the liquor remaining after the crystallization of muriate of soda from sea-water, which holds a quantity of it and of

* *Incompatible Substances.* See p. 115.

muriate of magnesia dissolved. This is boiled down, and when exposed to sufficient cold, affords acicular crystals of sulphate of magnesia. The crystals procured by this process are deliquescent, from the presence of a little muriate of magnesia; they are obtained more pure by a slower evaporation, or by a second crystallization, and then form large regular crystals, which are rather efflorescent. They are soluble in nearly an equal weight of water at 60°. Their taste is extremely bitter.*

This salt is used as a purgative, in a dose of from one to two ounces, dissolved in water. Though its taste be bitter, it has been remarked that it remains better on the stomach than many other cathartics, especially when given in small repeated doses, and in a solution largely diluted. Exhibited in this manner, it has been particularly recommended in ileus and colica pictonum; and is besides in common use in all cases in which saline cathartics are indicated. It is often an ingredient also in purgative enemas. Cases of poisoning sometimes happen from oxalic acid being taken by mistake for Epsom salt. The acid taste of the former should distinguish it, and its changing the colour of blue paper to red. Chalk and magnesia are antidotes, (see Oxalis acetosella).

Sulphas sodæ, Sulphate of Soda, long known by the name of Glauber's Salt, is prepared by various processes on a large scale. In the process given in the Pharmacopœias, it is obtained from the residuum of the decomposition of muriate of soda, by sulphuric acid, in the preparation of muriatic acid. The saline mass is dissolved in water; any excess of acid is neutralized by the addition of lime, and the pure sulphate of soda is obtained by evaporation. Its crystals are six-sided prisms; they are efflorescent, soluble in three parts of cold, and in an equal part of boiling water. The taste of this salt is very bitter and nauseous; but operating effectually and mildly, it is one of the saline purgatives in common use. Its medium dose is an ounce and a half, dissolved in six or eight ounces of water.†

Sulphas potassæ. Sulphate of Potash is prepared by neutralizing the excess of acid in the saline mass which is the residuum of the distillation of nitric acid from sulphuric acid and nitre. It forms in irregular crystals, which require 17 parts of cold water for their solution. In a dose of 4 or 6 drachms it acts as a purgative, but its sparing solubility prevents it from being much employed; in one of 2 or 3 drachms it is given as an aperient, in combination with rhubarb or other vegetable cathartics.‡

Super-tartras potassæ. Super-tartrate of Potash, or Bitartrate

* *Incompatible Substances.* The fixed alkalies and their sub-carbonates, lime water, muriate of lime, ammonia, nitrate of silver, and the acetate of lead.—B.

† *Incompatible Substances.* The same as those of sulphate of magnesia.—B.

‡ *Incompatible Substances.* Tartaric acid, muriate of lime, nitrate of silver, and the acetate of lead.—B.

of Potash; Crystals or Cream of Tartar, (Tartarum Crystalli vel Cremor Tartari.)

This salt is deposited from wine, in the progress of the slow fermentation which it suffers when kept. It is derived from the juice of the grape, and is separated as the quantity of alcohol (in which it is soluble) increases. The deposite Tartar, as it is named, adheres to the sides of the casks in which wine is preserved; it is of a red colour, from part of the colouring matter adhering to it: from white wines it is deposited of a lighter shade, and hence the distinctions of red and white tartar in commerce. It is purified by boiling it in water with a portion of pure white clay, which appears to attract its colouring matter; from the boiling liquor strained while hot, crystals are deposited on cooling, white and semi-transparent, of no very regular form. These used to be named Crystals of Tartar, while the crust collected from the surface of the boiling liquor was named Cream of Tartar. They are both the same salt, the Bitartrate of Potash, composed of two equivalents of Tartaric acid, 132, combined with one of potash, 48, and two of water, 18,=198. Its taste is sour, from its excess of acid. It is sparingly soluble in water, requiring about 60 parts of cold, or 30 of boiling water, for its solution. It operates as a purgative in a dose of 4 or 6 drachms, and being free from any unpleasant taste, it is not unfrequently used, more especially in inflammatory states of the system. It is, from its insolubility, given generally under the form of electuary; the only inconvenience attending its operation is its being liable to occasion flatulence: and if habitually used, it is liable, from its acidity, to injure the tone of the stomach. It appears, at the same time, to increase the action of the absorbent system; hence it acts as a diuretic, and as a hydragogue and diuretic is one of the remedies most frequently employed in dropsy; it is also the cathartic most effectual in removing obesity. As a diuretic and refrigerant it is to be afterwards noticed.*

Tartras potassæ. Tartrate of Potash. Tartarum Solubile. Soluble Tartar.

This salt, the neutral tartrate of potash, formerly named Soluble Tartar, from its great solubility, is prepared by saturating the excess of acid in the super-tartrate by the addition of a solution of carbonate of potash. It is a mild purgative, and at the same time operates effectually, given in a dose of six drachms or an ounce.†

Tartras sodæ et potassæ. Tartrate of Soda and Potash.

This salt, formerly known by the name of Rochelle Salt, is a double one, being prepared by saturating the excess of acid in the super-tartrate of potash by adding a solution of carbonate of soda. It crystallizes in large and regular transparent rhomboidal prisms, which are permanent in the air, and soluble in about six parts of cold water. Its taste is less unpleasant than that of the greater number of the

* *Incompatible Substances.* Mineral acids, alkalies and alkaline earths.—B.

† All the acids convert this salt into a super-tartrate. Lime water, muriate of lime, nitrate of silver, and the acetates of lead.—B.

saline purgatives, and it is therefore often prescribed. Its medium dose is an ounce, given usually dissolved in tepid water, with frequently the addition of manna, and of peppermint water, or tincture of cardamom.

PHOSPHAS SODÆ. Phosphate of Soda.

THE process for preparing this salt, which is rather complicated, is afterwards to be considered. It crystallizes in rhomboidal prisms; it is efflorescent, soluble in little more than three parts of cold, and in half that quantity of boiling water. Its taste is the least nauseous of all the saline purgatives, and is indeed perfectly mild, and its operation is equally mild and effectual. Hence it has been introduced into practice, and is peculiarly useful as a cathartic where there is any tendency to nausea. One ounce of it is given, dissolved generally in tepid water, with the addition of a little peppermint or any other grateful aromatic. The only objection to this salt is that it is more expensive than the common purgative salts.*

MURIAS SODÆ. Muriate of Soda. (Chloride of Sodium.)

THIS salt consists, according to the old doctrine, of soda and muriatic acid; or, according to the new view, is a compound simply of chlorine and sodium when dry, and only a salt when in solution. It is the most abundant saline natural product. It exists in a fossil state, forming what is named Rock Salt; it is the principal saline ingredient in the water of the ocean; and is a common ingredient in mineral waters. It is usually procured by evaporation from sea-water, in small irregular crystals: when more regularly crystallized, the form of its crystals is a cube; its taste is purely saline. Like other salts, it excites thirst, an effect probably arising from its action on the absorbents; it also operates as a grateful stimulant on the stomach, and hence its universal use as a condiment. In large doses it proves purgative; but its strongly saline taste prevents it from being employed: it is sometimes, however, the principal ingredient in purgative mineral waters, in which it operates more powerfully, probably from the state of dilution. It forms the active ingredient of the common domestic enema; from half an ounce to an ounce of it being dissolved in a pound of tepid water, and a small quantity of expressed oil added.

Besides the preceding Cathartics, there are some which are employed as such only under the form of Enema.

TEREBINTHINA VENETA. Venice Turpentine. *Pinus Larix. Monœc. Monadelph. Coniferæ.*

THE resinous juice of this tree, the Larch, exudes from incisions made in its trunk. It is of the consistence of honey, has the peculiar smell of the turpentines, and a bitter acrid taste. It consists of resin and essential oil; sometimes it is employed as a cathartic under the form of enema, half an ounce of it being triturated with the yolk of an egg, and suspended in a sufficient quantity of water. As

* *Incompatible Substances.* Lime, magnesia, the sulphuric, nitric, and hydro-chloric acids.—B.

it has a considerable share of acrimony, it is employed only where those of milder operation fail.

Dr. Perceval recommends it highly in epilepsy connected with fatuity, and Dr. Pritchard of Bristol is an advocate for its employment in cases of the same disease, depending on a deranged state of the uterine system.

Nicotiana tabacum. Tobacco.

The smoke of tobacco, introduced into the intestines, has succeeded in producing evacuation in colic and ileus, after other purgatives have failed, perhaps from its narcotic operation inducing relaxation of the muscular fibre. An infusion of one drachm of it in a pint of warm water is more convenient; but much caution is requisite in the use of either, as tobacco, from its narcotic power, is apt to induce extreme sickness and debility. It is only where other methods have been unsuccessful that its administration can be proper.

[Juglans cinerea. Butternut. Oilnut. White Walnut. *Monœc. Polyand.* Nat. Ord. *Juglandeæ. Cortex. America.*

The Butternut is a well known forest tree, abundant in almost every part of the United States. It flowers in April and May. The part used in medicine is the inner bark, an extract of which furnishes us with one of our most valuable indigenous cathartics. Dr. Bigelow informs us that the bark of the branches affords a large quantity of soluble matter, principally of the extractive kind. In a concentrated tincture he could discern no appearance of resin. Gelatin did not detect the presence of tannin. The sulphate of iron caused a brownish-black colour. Water is an adequate solvent for the butternut, and the watery extract one of its best preparations. As a cathartic it has been known and used in this country for many years. During the revolutionary war it was extensively used in our military hospitals, and found to be a valuable substitute for jalap and other cathartics. The character which it then acquired, it has since retained; and it is at present very generally used in the practice of this country. As a mild laxative, calculated to obviate habitual costiveness, it may be considered as unrivalled, as it is not succeeded by any of those unpleasant consequences which generally attend the frequent use of other articles. From the mildness of its operation it has been much celebrated in the treatment of dysentery. As the virtues of this extract depend very much upon the method of preparing it, as well as upon the season when the bark is collected, both these circumstances should be carefully attended to. The proper time for gathering it is in the months of May and June. The bark of the root possesses the property of exciting a blister when applied to the skin.

The dose of the extract is from 10 to 30 grains, according to the effect intended to be produced.—B.]

[Podophyllum peltatum. May apple. Mandrake. Wild Lemon.

Ipecacuanha. *Polyand. Monogyn.* Nat. Ord. *Podophylleæ. Radix. United States.*

This plant is common to almost every part of the United States, and is found inhabiting low, moist, and shady situations. It flowers in May and June. The leaves of this plant are poisonous, and the root is the only part used in medicine.

According to analysis it contains a resin, a bitter extractive matter, fœcula, and a slight proportion of a gummy substance. As a medicine this plant holds a high rank in the list of our indigenous cathartics. From a series of very ingenious comparative trials instituted by Dr. Schneck, it appears to possess virtues strikingly similar to those of jalap. He concludes that "the only difference between them is that the May-apple root is more prompt in its effect, causes somewhat more nausea, but not occasioning any griping, which has been a constant attendant in the experiments made with the jalap."* In intermittent and remittent fevers, as well as in dropsies, the podophyllum has been esteemed more especially serviceable. According to Schoepf, it acts as an emetic. This effect, however, only follows its use in very large doses. In moderate doses, it operates simply as a cathartic. The dose is twenty grains to be given in substance or in powder. By our Indians it is considered as an anthelmintic; whether it possesses any powers of this sort independently of its operation as a cathartic, is extremely doubtful. The proper period for collecting the root for medicinal use is the autumn, when the leaves of the plant have turned yellow. It should be carefully dried, and then pulverized.—B.]

[Carbo ligni. Charcoal.

As an antiseptic, the virtues of common charcoal have long been known. Although not much used for other purposes, its properties are extensive and important. Upon the intestinal canal it acts as a mild but exceedingly efficient cathartic, while upon the stomach it produces in a very remarkable degree the effects of a local tonic. It has accordingly been used with very great success as a remedy in obstinate constipation of the bowels, and irritable states of the stomach. In the dysenteric forms of fever, as occurring in the West Indies, it was successfully administered by that distinguished medical philosopher, the late Dr. Robert Jackson, to whom, I believe, we are indebted for the first introduction of this valuable remedy into general practice. From a tea-spoonful to a table-spoonful of the charcoal is an average dose. It may be mixed in milk or water, and repeated according to circumstances.—B.]

* New-York Medical and Physical Journal, No. 5.

# CHAP. VIII.

## OF EMMENAGOGUES.

The medicines distinguished by the appellation of Emmenagogues, are those which are capable of promoting the menstrual discharge.

The suppression of this discharge is supposed to arise from debility of the uterine vessels, or deficiency of action in them. Hence it might be inferred, that the medicines capable of exciting it must be such as can stimulate these vessels.

General stimulants, or tonics, may to a certain degree have this effect, since, in consequence of their action, the uterine vessels must be stimulated in common with other parts. There are, accordingly, several stimulants, both diffusible and permanent, employed as emmenagogues.

It is doubtful whether there is farther any particular determination to these vessels. It is sufficiently certain, that there are many substances, which, when received into the stomach, have their stimulant operation more particularly determined to one organ than to another. It seems possible, *a priori*, that there may be substances disposed to act more peculiarly on the uterine system; yet experience scarcely confirms this supposition.

A stimulant effect, however, produced in neighbouring parts, seems to be in some degree propagated to the uterine vessels; hence several medicines exert an emmenagogue power, greater than can be ascribed to any general action they exert on the system. It is thus that some cathartics, such as aloes and black hellebore, have been supposed to act, their stimulus being communicated from the larger intestines to the uterus. They are probably of advantage too in amenorrhœa, simply as cathartics, removing that state of torpor in the intestinal canal connected with the disease; and more advantage is derived from the emmenagogues of this class than from any of the others.

There is also one stimulus, that of electricity, which can be brought to act more directly, and it has been sometimes found, under the form of weak shocks, transmitted through the pelvis, to operate as a powerful emmenagogue.

Suppression of the menstrual discharge seems to be sometimes connected with spasmodic affection, and hence some remedies belonging to the class of antispasmodics are prescribed occasionally as emmenagogues.

The remedies belonging to this class may be arranged in some measure according to these distinctions; the most active of them being substances belonging to other classes; and there being a few only supposed to have any specific emmenagogue power. With regard to all of them, it may be added, that there are no medicines so uncertain in their operation, and none in which the conclusions respecting their efficacy are more liable to fallacy. In general,

their administration requires to be continued for some time to obtain their beneficial effects.

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## EMMENAGOGUES.

FROM THE CLASS OF ANTISPASMODICS.

| | |
|---|---|
| FERULA ASSAFŒTIDA. | BUBON GALBANUM. |

FROM THE CLASS OF TONICS.

| | |
|---|---|
| FERRUM. | HYDRARGYRUM. |

FROM THE CLASS OF CATHARTICS.

| | |
|---|---|
| ALOE. | HELLEBORUS NIGER. |
| RHEUM PALMATUM. | CROTON TIGLIUM. |

| | |
|---|---|
| IODINIUM. | JUNIPERUS SABINA. |
| SINAPIS ALBA. | OPOPONAX. |
| RUBIA TINCTORUM. | [POLYGALA SENEGA.—B.] |
| RUTA GRAVEOLENS. | [SECALE CORNUTUM.—B.] |

ASSAFŒTIDA. Assafœtida.—All the fetid gums have been supposed to possess, along with their antispasmodic property, the power of acting more peculiarly on the uterine system, and have been therefore employed as emmenagogues. Assafœtida, the strongest of them, has been given in amenorrhœa, in a dose of ten to fifteen grains, or in the form of tincture in the dose of one drachm. GALBANUM, another of these fetid gums already noticed, next in strength to assafœtida, has been given in a similar dose. Both of them are usually employed in that form of amenorrhœa which is connected with hysteria ; they are also occasionally combined with aloes.

FERRUM. Iron.—The powers of iron as a tonic may be supposed capable of being exerted on the uterine system, and of removing suppression of the discharge arising from deficient action of the uterine vessels, more especially when this is connected with a state of general languor and debility. In such cases, accordingly, it is frequently employed as an emmenagogue. The carbonate of iron, combined with an aromatic, is given in a dose of five or ten grains daily, continued for some time ; the more active preparations of the sulphate and muriate are likewise prescribed, but in general there is some difficulty in continuing their administration, unless in very small doses, from the irritation they are liable to occasion. The chalybeate mineral waters afford perhaps the best form of administering iron in amenorrhœa, an advantage derived from the state of dilution in which it is taken.

HYDRARGYRUM. Quicksilver.—The general stimulant operation

of this metal may, like that of iron, be supposed to be so far exerted on the uterine system, as to obviate any state of diminished action; some of its preparations are accordingly occasionally employed in amenorrhœa, and with very evident advantage. The mild muriate or calomel is the preparation generally used. It is given in the dose of a grain; and more frequently in combination with other emmenagogues, to promote their action, than alone.

ALOE. Aloes.—This cathartic, it has already been remarked, is supposed to operate more peculiarly on the larger intestines; and its stimulant operation, it has been imagined, is thence propagated to the uterus. Hence its celebrity as an emmenagogue, though what efficacy it has probably depends principally, if not entirely, on its cathartic power, and its effect, in consequence of this, of removing the torpor of the intestinal canal. The peculiarity of its operation as a cathartic, already pointed out, renders it however extremely proper for continued administration. It is given under the form of pill or tincture; and frequently in combination with other remedies, particularly with myrrh, rhubarb, and the preparations of iron. The aloetic wine, and the etherial aloetic tincture, are common forms of preparation under which it is prescribed in amenorrhœa.

RHEUM PALMATUM.—Rhubarb has some analogy to aloes in its cathartic operation, and, like it, has been supposed to produce, probably in consequence of this operation, an emmenagogue effect. It is usually given combined with aloes, either under the form of the Compound Pills of Aloes and Rhubarb, or the Tincture of Aloes and Rhubarb. The latter forms a popular remedy usually employed in occasional suppression of the menses, being taken in the dose of two drachms at bed-time.

HELLEBORUS NIGER.—Black Hellebore is a powerful cathartic; it was recommended by Mead as an emmenagogue under the form of tincture, one drachm of this being given as a dose at bed-time, and continued for some time. Its emmenagogue power might be supposed to depend on its cathartic operation; in this dose, however, and under this form, it has little sensible effect; and any advantage derived from it is extremely doubtful. The extract has been employed as a more active preparation in combination with aloes, or with carbonate of iron.

CROTON TIGLIUM.—Croton oil is said to be employed in India as an emmenagogue, and with success. So powerful a stimulus to the intestinal canal may have such an effect, but it is scarcely advisable to use, for this purpose, a remedy which is always attended with some risk.

IODINIUM. Iodine.—This is a simple substance, of which some notice has already been given, (page 16.) It is asserted by continental practitioners to act as a powerful emmenagogue, but the ex-

perience of British practitioners does not confirm their remarks. Its more peculiar agency, that of stimulating the absorbents, in consequence of which it proves of much service in bronchocele, and other diseases of glands, shall be considered under the history of the preparations of it recently introduced by the Dublin College.

*Offic. Prep.*—Iodin. tinct. Ung. iod. Potass. hydriod.

Sinapis alba. White Mustard. *Semina.*

The seeds of this plant have a considerable degree of pungency, and when taken unbruised to the extent of half an ounce or an ounce have a purgative effect. This is a popular remedy, not unfrequently used in amenorrhœa and chlorosis, and may have some effect by its stimulant action on the intestinal canal.

Rubia tinctorum. Madder. *Tetrand. Monogyn. Stellatæ*, Linn. *Rubiaceæ*, Juss. *Radix. South of Europe.*

The root of this plant, freed from its bark, is dried and prepared for its use in dyeing : it is in slender twigs, of a red colour : has a bitter taste, with little smell. Its colouring matter is extracted by water and alcohol. From the fact that the bones of animals are tinged of a red colour when it is taken mixed with their food, it was once supposed to be a medicine of great subtlety ; but this appears to be an effect purely chemical, depending on the affinity exerted by the colouring matter to phosphate of lime. It has been celebrated as an emmenagogue, in a dose of half a drachm thrice a-day, but its inefficacy is generally acknowledged.

Ruta graveolens. Rue. *Decand. Monogyn. Multisiliquæ*, Linn. *Rutaceæ*, Juss. *Herba. South of Europe.*

This herb, when recent, has a strong unpleasant smell, and a bitter taste. By distillation it affords a pungent essential oil. It has been prescribed as an emmenagogue under the form of the watery infusion of the dried leaves, and the oil is sometimes combined with aloes, and other medicines of the same class, probably with little advantage.

*Offic. Prep.*—Extr. rutæ. Ol. rutæ. Conf. rutæ.

Juniperus sabina. Savin. *Diœcia Monadelph. Coniferæ*, Linn. Juss. *Folia. South of Europe.*

The leaves of this shrub have a bitter penetrating taste, a strong unpleasant odour, and a considerable degree of acrimony. They afford a very large quantity of essential oil, possessing the general virtues of the plant.

Savin is a stimulant, the operation of which has been supposed to be powerfully directed to the uterine system ; so much so, that, according to the common opinion, it is capable of producing abortion, but this is doubtful. It appears to possess greater power as an emmenagogue than any of the substances which have been mentioned, and is sometimes given with advantage in amenorrhœa. It is an ingredient in some of the empirical medicines that are sold for this purpose, and which have sometimes proved very hurtful. Its dose is

from half a drachm to a drachm of the fresh leaves. Externally the powder of the dried leaves is used as an escharotic, and mixed with lard forms an useful issue ointment.

*Offic. Prep.*—Ol. sabin. Cerat. sab. Ung. sab.

Opoponax, the gum resin of the Pastinaca Opoponax was formerly regarded as an emmenagogue, but it is now discarded from use.

[Polygala senega. Seneka, or Rattlesnake Root.

The general properties of the seneka being noticed under the class of expectorants, I shall in this place only allude to the virtues which it is alleged to possess as an emmenagogue. It is to Dr. Hartshorne of Philadelphia that we are originally indebted for this discovery. Dr. Chapman, however, first announced it to the public in an essay which appeared in the Eclectic Repertory for the year 1812. Both of these gentlemen appear to have had very extensive experience on this subject, and they concur in considering it as entitled to the highest rank in the class of emmenagogue medicines. Dr. Chapman more especially speaks of it in terms of the most unqualified commendation. He says, "of the emmenagogues which I have tried, this is among the most efficacious, and will be found so in all the forms of amenorrhœa, if administered with a due regard to the state of the system, and in other respects with correct discrimination."* He adds that he thinks it more particularly useful in those cases where the decidua exist. Notwithstanding this decided testimony in favour of this article, it should not be concealed that by other physicians very different opinions are entertained with regard to it. Dr. Eberle affirms that he has tried it repeatedly, but uniformly without success. And he adds, that he is "entirely convinced that Dr. Chapman has expressed an opinion much too favourable of its efficacy as an emmenagogue."† The best mode of administering the seneka is in the form of decoction, made by simmering in a close vessel ℥j of the bruised root in a pint of boiling water, until the quantity is reduced about one third. About ℥iv of this decoction to be taken during the day, to be increased as far as the stomach will bear at the period when the menses are expected to appear.—B.]

[Secale cornutum. Spurred Rye. Horned Rye. Ergot of Rye.

The precise nature and origin of the ergot is not yet understood. By some it is believed to be a morbid modification of the seed of the rye; others suppose it to be the production of an insect; while by a third party it is viewed as a parasitic fungus, resembling the different sorts of smut, &c. The latter of these opinions seems to be in every respect the most probable. Besides rye, the ergot is found attached to several other species of the gramina. Low and moist situations, wet seasons, and newly cleared grounds are said more particularly to favour its production. When taken into the mouth, the

* Elements of Materia Medica and Therapeutics, vol. II. p. 8. second edition.
† A Treatise of the Materia Medica, &c. vol. I. p. 423.

taste of the ergot is imperceptible. After a short time it becomes disagreeable, nauseous, and sub-acrid. According to the analysis of Vauquelin, it contains, 1. A fawn yellow colouring matter, soluble in alcohol, and having a taste resembling that of fish oil. 2. A white oily matter, of a sweetish taste, which appears to be very abundant. 3. A violet colouring principle, of the same shade as that of orchil, but differing from it by its solubility in alcohol, and which can be readily fixed on aluminated wool and silk. 4. A free acid, supposed to be partly phosphoric. 5. A very abundant vegeto-animal substance, much disposed to putrefaction, and which furnishes a considerable quantity of thick oil and of ammonia by distillation. 6. A small quantity of free ammonia, which can be obtained at the temperature of boiling water. As an article of the Materia Medica, the ergot was first introduced to the notice of the medical public in 1807, by Dr. Stearns of New-York, as a substance capable of acting specifically upon the uterus, and of accelerating in a very extraordinary manner the process of parturition. As might naturally be expected from the announcement of a remedy so novel and unique, it excited much interest, and as soon as subsequent experience had confirmed its virtues, rose at once into the most unlimited popularity. At present we believe it is universally used throughout this country, and has in a very great degree superseded the use of instruments in difficult and protracted labours. Notwithstanding this very general use of the ergot, there are not a few of our most respectable medical men who look upon it with suspicion, considering it in almost every case in which it is administered as jeopardizing the life of the child. The editors of the New-England Journal of Medicine and Surgery first suggested this opinion in 1812, and they stated that they had been led to it, from "observing that in a large proportion of cases where the ergot was employed, the children did not respire for an unusual length of time after the birth ; and in several cases the children were irrecoverably dead." It will not be denied by any one acquainted with the operation of the ergot, that, if given in very large doses or at improper periods, it may produce effects exceedingly injurious, if not fatal, to the child. Yet that these are to be considered as the common and necessary consequences attending its use, is contradicted by evidence the most clear and satisfactory. In a very instructive paper on the subject of the secale cornutum, Dr. Stearns has laid down a set of comprehensive rules regulating its administration. They are in all respects entitled to the serious consideration of every practitioner of the obstetric art. The cases in which he states that it ought never to be administered are the following :

1. It should never be administered where nature is competent to a safe delivery.

2. It should never be administered until the regular pains have ceased, or are ineffectual, and there is danger to be apprehended from delay.

3. It should never be administered until the rigidity of the os tincæ has subsided, and a perfect relaxation been induced.

4. It should never be administered in the incipient stages of labour, nor until the os tincæ is dilated to the size of a dollar.

5. It should never be administered in any case of preternatural presentation that will require the fœtus to be turned.

6. It should never be administered during the continuance of one labour, in larger quantities than thirty grains by decoction in half a pint of water. A table-spoonful of this given every ten minutes generally succeeds better than a larger dose. While this quantity produces its most favourable effects upon the uterus, it does not affect the stomach with nausea or vomiting, which sometimes interrupts its successful operation.

The ergot is indicated, and may be administered,

1. When, in lingering labours, the child has descended into the pelvis, the parts dilated and relaxed, the pains having ceased, or being too ineffectual to advance the labour, there is danger to be apprehended from delay, by exhaustion of strength and vital energy from hæmorrhage, or other alarming symptoms.

2. When the pains are transferred from the uterus to other parts of the body, or to the whole muscular system, producing general puerperal convulsions. After premising copious bleeding the ergot concencrates all these misplaced labour-pains upon the uterus, which it soon restores to its appropriate action, and the convulsions immediately cease.

3. When in the early stages of pregnancy, abortion becomes inevitable, accompanied with profuse hæmorrhage and feeble uterine contractions.

4. When the placenta is retained from a deficiency of contractions.

5. In patients liable to hæmorrhage immediately after delivery. In such cases the ergot may be given as a preventive a few minutes before the termination of the labour.

6. When hæmorrhage or the lochial discharges are too profuse immediately after delivery, and the uterus continues dilated and relaxed without any ability to contract.*

From what has already been advanced concerning the operation of the ergot, it is evident that it can have no claims to be considered as an emmenagogue. It seems in all cases rather to check than to promote uterine discharges.—B.]

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## CHAP. IX.

### OF DIURETICS.

Diuretics are those medicines which increase the urinary discharge; an effect which is probably produced by different modes of operation.

It is obvious, that any substance capable of stimulating the secret-

* New-York Medical and Physical Journal, No. 3.

ing vessels of the kidneys, by direct application to them, may increase their action, and thus produce a more copious discharge of urine. It is probably in this way that many of the saline diuretics act. The principal purpose of the urinary secretion seems to be to separate from the blood the saline matter it contains, and which would otherwise accumulate in the system: when substances of this kind, therefore, do not operate as cathartics, but are received into the circulating mass, they are brought to the kidneys in the course of the circulation, are secreted by their vessels, and exciting in them increased action, a larger portion of watery fluid is at the same time secreted. Several of these substances, as nitre and subcarbonate of potash, can be detected in the urine by chemical tests after they have been administered, and therefore there can be little doubt of this being the mode in which they operate. There is evidence even of some vegetable diuretics passing off by the same emunctory. The flavour of asparagus, or of garlic, or turpentine, for example, may be observed in the urine discharged an hour or two after they have been received into the stomach.

It is also probable, however, that a diuretic effect is in other cases produced by substances acting only on the stomach, the action they excite being communicated by sympathy to the kidneys. Squill and tobacco appear to act in this manner; there is no proof that they are received into the circulating mass; they act very peculiarly on the stomach, and, when they occasion vomiting or purging, they generally fail in their diuretic effect. It may be concluded, therefore, that they exert a peculiar action on the stomach, which, propagated to the kidneys, by means of the general connection subsisting between all the parts of the system, causes an increase in the urinary discharge. The different kinds of ardent spirits, diluted with water, seem to act in a similar manner, as their diuretic effect usually takes place very speedily.

There is still a third mode, in which it is probable that some substances produce a diuretic effect, especially in a state of disease. It is known that persons who drink sparingly discharge less urine than others; and also that where the watery part of the blood is carried off by perspiration, the urinary discharge is diminished. It is farther known, that large draughts of water, or of any mild diluent, if not determined to the skin by external warmth, occasion an increased discharge of urine. It seems probable, therefore, that a similar effect may be produced by the action of substances which powerfully stimulate the absorbent system, and thus bring an increased quantity of serous fluid into the circulating mass. Digitalis is probably a remedy of this kind. Its effect as a diuretic is more certain and powerful, when given to a person labouring under dropsy, than to one in health; in the latter state, indeed, any such effect is scarcely apparent. It appears too to be one of those medicines which stimulate most powerfully the absorbent system; its diuretic power in dropsy, therefore, is probably principally owing to its enabling the absorbents to take up the serous fluid effused; this is of course brought into the circulation, and, like any other watery fluid, is discharged by the kidneys. In cases where a large quantity of fluid has been

accumulated, it often produces a discharge so sudden and profuse, as could not be produced unless the action of the absorbents were greatly excited.

On the same principle may be explained the utility of a practice, which is often employed to promote the action of diuretics, that of conjoining mercury with them. Thus the action of squill, as a diuretic, is rendered more certain and powerful by combination with calomel; each of them being given in separate doses, or both being united in one formula. The efficacy of this is probably derived from the mercury stimulating the absorbents, and, by introducing the effused fluid into the system, promoting the direct diuretic action of the squill.

The effect of these remedies is promoted by drinking moderately of watery liquors; hence the practice that was formerly adopted in dropsy, of diminishing the allowance of drink, is exploded; it was of little benefit in preventing the accumulation of effused fluid, and the abstinence from liquids that was enjoined, rather prevented the action of the diuretic remedies that were employed for the cure of the disease. Many cases even have occurred, in which pure water, mineral waters, or mild diluents, have acted as diuretics, and effected a cure in dropsy.

The action of diuretics is also considerably dependent on the state of the vessels of the skin. If, when a medicine of this class has been given, these vessels are stimulated by external warmth, its action is rather determined to the surface, and sweat or diaphoresis takes place. But if the surface is kept cool, the diuretic effect is more certain; so much indeed does this state of the surface determine to the kidneys, that the usual diaphoretics may be brought to act as diuretics.

The general effects of diuretics are sufficiently evident. They discharge the watery part of the blood, and by that discharge they indirectly promote absorption. Dropsy is the disease in which they are principally employed, and they are adapted to every form of it. When the urinary discharge can be excited by their administration, the disease is removed with less debilitating effect, and with less injury to the patient, than by any other method. The only other, indeed, that can be employed, is evacuation by purging, which the exhausted state of the system is often unable to sustain. The success of diuretics in dropsy is, however, very precarious; sometimes none of them succeed; sometimes one acts more powerfully than another, though in this there is no uniformity; nor are the causes of this variety of operation well understood. In general it is obvious, that where a strong predisposition to the disease exists, or where it originates from organic affections of the liver, or other chylopoëtic viscera, no great advantage can be expected from the mere evacuation of the water by the action of diuretics; it is only in those cases where an accumulation of fluid has taken place from diminished absorption, or some similar cause, that they can be expected to effect a cure. It accordingly often happens in practice, that an increased discharge of urine is effected by the exhibition of diuretics, and still the dropsical swellings are not removed, or if they are, they

speedily return. The combination of Tonics with Diuretics, or the administration of a tonic after the diuretic has operated, is useful in preventing a relapse.

Diuretics have been used in calculous affections, with the view of preventing the increase of the calculus, by rendering the urine more watery; and they have occasionally, though rarely, been employed to lessen plethora, or check profuse perspiration. The use of diluents, so as to increase the quantity of urine, is of advantage in gonorrhœa, and other affections of the urinary passages, by lessening the acrimony of the urine, which excites pain from its action on these parts, when they are in an inflamed state.

The cautions with regard to the administration of diuretics are obvious from what has been said of their operation. The surface of the body must be kept cool, and therefore the doses of the medicine ought to be given in the course of the day, and the patient should, if possible, be kept out of bed; their operation is thus more effectually determined to the kidneys. The use of diluents ought to be permitted; at least this is more necessary with respect to those diuretics belonging to the class of salts, and which operate directly on the secreting vessels of the kidneys, and indeed is probably useful with regard to them all.

The individual diuretics may be considered under the subdivisions of Salts, Vegetable Diuretics, and one or two derived from the animal kingdom.

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## DIURETICS.

### SALINE DIURETICS.

Potassæ subcarbonas.
——— acetas.
——— super-tartras.
Potassæ nitras.
Sodæ acetas.
Spiritus ætheris nitrosi.

### FROM THE VEGETABLE KINGDOM.

Scilla maritima.
Digitalis purpurea.
Nicotiana tabacum.
Solanum dulcamara.
Diosma crenata.
Lactuca virosa.
Colchicum autumnale.
Polygala senega.
Gratiola officinalis.
Spartium scoparium.
Ulmus campestris.
Juniperus communis.
Copaifera officinalis.
Pyrola umbellata.
Pinus sylvestris.
Pinus abies.
Pinus larix.
Pinus balsamea.

### FROM THE ANIMAL KINGDOM.

Meloe vesicatorius.

### FROM THE MINERAL KINGDOM.

[Aurum.—b.]

## SALINE DIURETICS.

Potassæ subcarbonas.

Subcarbonate of potash operates as a diuretic; and, as has been already remarked, it is secreted by the kidneys, so that, when continued for a sufficient time, it renders the urine alkaline. It is, however, liable to occasion irritation; and being much inferior in diuretic power to the super-tartrate of potash, it has fallen into disuse. When employed, it is given in a dose of 20 or 30 grains dissolved in a large quantity of water, and repeated three or four times in the course of the day. The dilution is necessary, as the salt is caustic enough to act as a poison; and there have been instances where, swallowed in too concentrated a state, it has caused fatal consequences, particularly stricture of the œsophagus to such a degree, that the passage would scarcely admit a probe. Vinegar and oil are antidotes.*

Potassæ acetas. Acetate of Potash. Sal Diureticus.

This salt, prepared according to the process of the Pharmacopœia, is obtained in the state of a white foliated mass, deliquescent, and very soluble in water. It has considerable power as a diuretic, and as a hydragogue cathartic is used in dropsy, half a drachm of it dissolved in water being given every hour or two until it operate.†

Super-tartras potassæ. Crystali vel Cremor Tartari. Super-tartrate of Potash. Cream of Tartar.

This salt, of which the chemical history has been already given, and its application as a cathartic noticed, is extensively employed as a remedy in dropsy, and is inferior in efficacy to few of the substances belonging to this class. It is given either in a state of dilute solution, half an ounce or an ounce of the salt being dissolved in 8 or 10 ounces of water, and this taken during the course of the day, when it acts solely on the kidneys; or in doses of from half an ounce to two ounces of the solid salt, made into an electuary with syrup, when it acts as a hydragogue cathartic, as well as diuretic, rapidly evacuating the effused water. It is said that the dropsical effusion is less apt to return after it has been removed by this remedy than by any other. It is principally of use in ascites; when the disease is connected with visceral obstructions, the combination of squill and calomel proves more successful. It has the disadvantage of hydragogue cathartics of weakening the general system, and it is rather liable to occasion flatulence and nausea, and to impair the appetite. The general remark already stated applies to this as well as to other

* *Incompatible Substances.* Acids and acidulous salts, muriate of ammonia, acetate of ammonia, lime water and muriate of lime, sulphate of magnesia, alum, tartarized antimony, nitrate of silver, ammoniated copper, ammoniated iron and its tincture, sulphate of iron, muriated tincture of iron, calomel and corrosive sublimate, the acetates of lead and sulphate of zinc.—B.

† *Incompatible Substances.* Sulphuric, muriatic, nitric, and other acids, sulphate of soda and of magnesia, as well as almost all metallic and earthy salts.—B.

diuretics, that sometimes it succeeds where others fail, and conversely.

Nitras potassæ. Nitrate of Potash. Nitrum. Nitre.

This salt, consisting of nitric acid and potash, is frequently formed on the surface of the soil in warm and dry climates. In the south of Europe, its production is usually accelerated by artificial arrangements. Animal and vegetable substances, in a state of decomposition, are mixed with a quantity of carbonate of lime; the mass is exposed to the air, but protected from the rain, and is occasionally stirred. After a number of months, the materials are found to contain nitrate of lime and nitrate of potash. These salts are extracted by lixiviation with water: impure subcarbonate of potash is added, by which the nitrate of lime is decomposed, and the quantity of nitrate of potash increased; and this salt is purified by repeated solutions and crystallizations. During the process by which the nitrate of potash is formed, it appears that the oxygen of the atmospheric air, and probably also part of the oxygen of the vegetable matter, combine with the nitrogen of the animal matter, so as to form nitric acid; the affinities whence these combinations arise being favoured by the affinities exerted by the lime. The acid is attracted in part by the lime, and in part by a quantity of potash, either contained in the materials, or, as some have supposed, formed during the process. The nitre used in this country is imported from India, where it occurs as a natural formation.

Nitrate of potash is crystallized in hexaedral prisms. Its crystals are soluble in six parts of cold, and in an equal weight of boiling water. It is decomposed by heat, affording a large quantity of oxygen gas; and, from the facility of this decomposition, is an important pharmaceutic agent in oxidating bodies by deflagration.

Nitre has a cool and sharp taste, and occasions a sense of coldness in the stomach when swallowed. When given in moderate doses, continued for some time, its presence can be detected in the urine by chemical tests. As a diuretic, however, it is weak, and though it was at one time used to relieve ardor urinæ in gonorrhœa, it is now only used as a refrigerant. If swallowed in the quantity of an ounce it acts as an irritant and narcotic poison, (Dr. Christison,) producing bloody vomiting and purging along with convulsions, which end in death. And fatal accidents have sometimes happened, from its being taken by mistake instead of sulphate of soda. Copious dilution with mucilaginous fluids, the application of the stomach pump, opium, and venesection, have been recommended in such cases.*

*Offic. Prep.*—Pot. nit. purif. Troch. nit. pot.

Sodæ acetas.—This salt is very similar to acetate of potash in its diuretic power, and has the advantage of not deliquescing. Its dose is from one to four scruples.

* *Incompatible Substances.* Sulphuric acid, alum, the sulphates of magnesia, zinc, iron, and copper.—B.

Spiritus ætheris nitrosi. Spirit of Nitrous Ether.

Nitric acid, added in due proportion to alcohol, converts it into a species of ether; but as the process is difficult, from the violent chemical action that takes place, it has long been the practice to use less acid than is required to change the whole alcohol into this product; a portion of nitric ether is formed, and this is obtained by distillation, combined with the unchanged alcohol. This process has a place in the Pharmacopœias, and forms what used to be named Spiritus Nitri Dulcis, but is now named Spiritus Ætheris Nitrosi. Its odour is fragrant; its taste sharp and acidulous. In medicine it is employed as a refrigerant and diuretic in a dose of 20 or 30 drops. Being grateful to the stomach, and relieving flatulence, it is often used to correct or promote the action of more powerful diuretics in dropsy.*

### DIURETICS FROM THE VEGETABLE KINGDOM.

Scilla maritima. Squill.

The medicinal applications of squill as an emetic have been already stated. Under this article are to be considered its powers as a diuretic.

Squill, foxglove, and super-tartrate of potash, are the diuretics principally employed in modern practice in the treatment of dropsy; and it is not easy to assign precisely their comparative powers, one frequently proving successful when either of the others has previously failed. Squill operates more directly as a diuretic than the super-tartrate of potash does, and is not liable, even if its administration has been carried rather far, to produce those injurious effects which arise from the action of foxglove in an over-dose. Hence it is frequently preferred. It often deranges, however, the action of the stomach, and occasionally fails in its diuretic effect.

As a diuretic, Squill is always given in substance, under the form of either the recent or the dried root. The dose of the former is from five to fifteen, of the latter from one to three grains; the smaller dose being given at first, morning and evening, in the form of a pill, and this increased slowly until its diuretic effect is obtained. If the dose is too large, it is liable to excite nausea; and the rule has even been delivered, to give it to the extent necessary to induce some degree of nausea. The production of this effect can be regarded, however, only as a test of the squill being in an active state; it is not necessary to its diuretic operation; it proves distressing to the patient; and it has been observed, that when it has once been given to such an extent as to induce this state of the stomach, the same state is more liable to recur even when after an interval it is given in smaller doses. Its nauseating operation, therefore, ought rather to be avoided by the due regulation of the dose.

The diuretic power of squill is promoted by combination with mercury, and it is more frequently employed in this combination than

* *Incompatible Substances.* With a solution of green sulphate of iron it strikes a deep olive colour, owing probably to its holding a portion of nitrous gas in solution; with the tincture of guaiacum it produces a green or blue coagulum.—B.

alone. Of the mercurial preparations either the blue pill, or calomel, may be used; the usual medium dose from which we obtain the general action of either on the system, being added to the dose of the squill, or being given in the evening, while the squill is given in the morning. The superiority of their combined action probably depends on the mercury stimulating the absorbent system, while the squill excites the action of the vessels of the kidneys. This combination is farther adapted to the treatment of dropsy, connected as it frequently is with obstruction or chronic inflammation of the liver or neighbouring organs, and is more successful in this case than any other diuretic. Where the mercurial preparation occasions purging, as this impedes the diuretic action of the squill, mercurial friction may be substituted.

DIGITALIS PURPUREA. Foxglove.

FOXGLOVE has been considered as a narcotic; it is a still more important article of the Materia Medica as a diuretic. It had been frequently used as an empirical remedy in dropsy; but the violence of its narcotic operation, when not administered with due precaution, prevented it from being employed in practice, until Dr. Withering pointed out, with more precision, the rules to be attended to in its exhibition.

It is difficult to compare the powers of the principal diuretics; yet, on the whole, perhaps foxglove is more powerful than any of them in evacuating the water in dropsy: and the conclusions of Withering are still nearly just, that "so far as the removal of water "will contribute to cure the patient, so far may be expected from "this medicine;" and that "although digitalis does not act universally "as a diuretic, it does so more generally than any other." In hydrothorax its superiority to other diuretics is more clearly established than in ascites or anasarca; and in the first of these states of dropsy, it is unquestionably superior to any other remedy.

There is a peculiarity in the operation of this remedy, that it may be continued for some time without sensibly increasing the flow of urine; the increase then suddenly commences, and often continues of itself for several days, and to a very great extent, without requiring the continued administration of the remedy, so that the dropsical effusion is more speedily reduced by the action of it than by any other diuretic. Its diuretic power, too, appears only when it is administered in dropsy, and hence there can be little doubt that it operates principally, if not entirely, by exciting the action of the absorbents, the absorbed fluid being discharged by the kidneys. The diuretic effect is not connected with its nauseating operation, or with the reduction in the force of the circulation; it can, on the contrary, be obtained without either of these accompanying it; and Withering remarked even, that he had found the increased discharge of urine to be checked, when the doses had been imprudently urged so as to occasion sickness. He observed also, that if it purges, it almost certainly fails, probably owing to its action being determined from the absorbents to the intestines.

The dose in which digitalis is given, when it is to act as a diure-

tic, is usually one grain of the powder of the dried leaves, or one ounce of the infusion, to be taken twice in twenty-four hours. There is no advantage in giving a large dose, or in increasing the dose by degrees, as the action of digitalis seems to depend not on the introduction of any large quantity at once, but its gradual accumulation in the system.

The administration of it ought not to be long continued if it fail in producing its diuretic effect. It always injures the tone of the stomach, even where it has not been pushed to that extent to occasion nausea; and there is the risk that, from its general debilitating operation, the powers of the system may suddenly sink.

There are other diseases in which foxglove has been supposed to prove useful by its power of promoting absorption; as in insania and epilepsy connected with serous effusion in the brain; and in dyspnœa arising from serous effusion in the bronchiæ,—anasarca pulmonum, as this affection is named.

It may, in the treatment of dropsy, be advantageously combined with other diuretics; and its action, like that of squill, is said to be promoted by mercury. An occasional dose of the spirit of nitrous ether is useful as counteracting nausea and flatulence, and aiding its diuretic effect.

Nicotiana Tabacum.

Tobacco, in its general action, has some resemblance to foxglove, being narcotic, emetic, and diuretic. As a diuretic, it has been employed in dropsy under the form of infusion, one ounce of the dried leaves being infused in a pint of water, and ten drops being given, and gradually increased to 60 or even 100. It possesses, however, no peculiar advantage, and its diuretic effect is generally accompanied with sickness and vertigo. It has been given with more advantage in dysuria; and probably where that disease is connected with spasmodic action, the tobacco may prove useful by its antispasmodic, added to its diuretic power.

Solanum dulcamara. Woody Nightshade. Bitter-Sweet. *Pentand. Monogyn. Solanaceæ*, Linn. *Solaneæ*, Juss. *Stipites. Indigenous.*

The young shoots or branches are the parts of this plant used in medicine; when first chewed they have a bitter taste, which is soon followed by a degree of sweetishness, a peculiarity whence its name is derived; their smell is strong and disagreeable. By drying, their activity is much impaired. Water extracts all their virtues, which depend on a newly discovered principle called Solania. It exists also in the Solanum Nigrum, from the berries of which it may be easily obtained by digesting them in alcohol and boiling the solution. It possesses all the properties of a vegetable alkali, and has a nauseous bitter taste.

This plant has a degree of narcotic and of diuretic power. An infusion or decoction of the dried stalks in water has been recommended in dropsy, but it is a remedy of uncertain operation, and is scarcely ever prescribed.

*Offic. Prep.*—Decoct. dulcamar. *Lond.*

Diosma crenata. Buchu. *Pentand. Monog. Rutaceæ,* Juss. *Folia. Cape of Good Hope.*

This shrub is a native of the Cape of Good Hope. The leaves resemble those of senna, but are broader, and are crenated at the margin; their upper surface is bright green, smooth and shining. They have a strong aromatic odour like that of peppermint, to which they are also similar in taste. They consist chiefly of gum and extractive matter, with chlorophylle, resin, and essential oil.

Infusion of Buchu leaves has long been used by the Hottentots for its diuretic and diaphoretic effects; it is now introduced into the Dublin Pharmacopœia. In chronic retention of the urine, in cases of morbid irritation of the bladder and urethra, it has been found serviceable as a diaphoretic; it is said to be useful in chronic rheumatism. A tincture of the leaves is employed as a stimulating embrocation.

*Offic. Prep.*—Infus. buchu. Tinct. buchu.

Lactuca virosa. Strong-scented Lettuce.

This plant, though it possesses a narcotic quality, is also a diuretic, and has been recommended under the form of the inspissated juice as a remedy in dropsy, the dose being gradually increased from five or ten grains to two or three drachms. Though celebrated by the German practitioners, it is never used in this country.

Colchicum autumnale. Meadow Saffron. *Hexand. Trigyn. Liliaceæ,* Linn. *Colchicaceæ,* De Cand. *Radix, Semina. Indigenous.*

The root of this plant is bulbous; when recent it is extremely acrid, a small quantity occasioning a sense of burning heat in the stomach, strangury, and tenesmus; at other times it is entirely void of acrimony; differences which are owing to climate, age, or season.

Colchicum contains the vegetable alkali Veratria, which was first discovered by Pelletier and Caventou in the Veratrum album or White Hellebore. The presence of this alkaloid in both plants accounts for a curious coincidence respecting the empirical remedy celebrated on the Continent, under the name of Eau Medicinale d'Husson, for the cure of gout. One chemist regarded it as a preparation from colchicum, by another it was believed to be prepared from veratrum album; it now appears that it is formed from the colchicum, but its medicinal effects are undoubtedly owing to the veratria which both plants contain.

Veratria exists in both these plants in combination with gallic acid; when obtained pure it is in the form of a white powder, inodorous, very soluble in alcohol, but scarcely so in water; at 122° it melts, and has the appearance of wax. The salts it forms are uncrystallizable by evaporation, and present the appearance of gum. Veratria given in very small doses produces violent vomiting and purging; it is poisonous in large doses, acting as an acrid narcotic.

Colchicum, under the form of oxymel or syrup, was used by Stöerk

in dropsy ; its operation, however, being uncertain, it is seldom employed as a diuretic. From the narcotic power of the veratria, preparations of colchicum act as anodynes, and seem to have a specific effect in relieving the pain of gout. The Eau Medicinale d'Husson, which has been used with advantage in this disease, is prepared by boiling two ounces of the root of colchicum in four ounces of white Spanish wine, and then filtering. Wine of colchicum has a place in the London Pharmacopœia, as an imitation of it, and a tincture and vinegar of colchicum have been introduced into the last edition of the Dublin Pharmacopœia ; the latter are the best forms in which colchicum can be administered, its principle Veratria being soluble in alcohol and in vinegar. The tincture is prepared from the seeds, which are more uniform in their activity than the root. The preparations of colchicum have also been recommended in phthisis, hydrothorax, laryngitis, and combined with purgatives in bronchitis. There is, however, always a degree of uncertainty in their operation, and sometimes it is hurtful ; in gout they have repeatedly proved injurious.

*Offic. Prep.*—Syr. colch. Oxymel colch. Acet. colch. Sp. colch. Tinct. colch.

POLYGALA SENEGA. Seneka. Rattlesnake Root. *Diadelph. Octand. Lomentac,* Linn. *Polygaleæ,* Juss. *Radix. North America.*

THIS root is in articulated shoots or joints like those of the tail of the rattlesnake ; hence its name, and hence, probably, the use of it by the Senegaro Indians as a remedy for the bite of that snake, on the same principle that the mineral named nephrite, being in the shape of a kidney, was formerly considered a remedy for nephritic complaints. The root is of a greyish-yellow colour, wi h a bitter pungent taste. It contains a substance which has been termed Senegin, of a brown colour, soluble in alcohol but not in water, and which produces violent sneezing when applied to the nostrils.

Seneka appears to stimulate the absorbent system, and hence acts as a diuretic ; it has also a cathartic power. It has been found useful in some cases of dropsy, but is apt to disorder the stomach. It is also used as an expectorant.

*Offic. Prep.*—Decoct. seneg.

GRATIOLA OFFICINALIS. Hedge-Hyssop. *Diand. Monogyn. Personatæ,* Linn. *Scrophulariæ,* Juss. *Herba.*

THIS plant is cultivated in our gardens. Its leaves have a strong bitter taste, with little smell. They prove emetic and cathartic, but in a smaller dose produce a diuretic effect, and have been recommended under the form of infusion in the treatment of dropsy, two drachms being infused in half a pint of warm water, and a table-spoonful being given twice or thrice a-day. Their operation, however, is always uncertain, and liable to be violent.

SPARTIUM SCOPARIUM. Broom. *Diadelph. Decand. Papilionac.* Linn. *Leguminos.* Juss. *Summitates. Indigenous.*

The tops of the young branches of the broom have a bitter taste, which is communicated both to water and alcohol. The watery decoction, prepared by boiling an ounce of the tops in a pint of water to half a pin , is used as a popular remedy in dropsy, and sometimes with success. It acts as a cathartic and diuretic ; being taken in divided doses through the day until its operation is obtained.

Ulmus campestris. Elm. *Pentand. Digyn. Scabridæ,* Linn. *Urticeæ,* Juss. *Cortex interior. Indigenous.*

The interior bark of the elm has a place in the Pharmacopœias, though little employed. It has a bitterish taste, and when boiled with water affords a mucilaginous liquor. This decoction is said to operate as a diuretic, but does not appear to be of sufficient activity to form a remedy of any value in the treatment of dropsy. Advantage has been said to be derived from it in some cutaneous affections, especially some forms of lepra. *Offic. prep.*—Decoct. ulmi.

Juniperus communis. Juniper. *Diœcia, Monadelph. Coniferæ, Baccæ, Cacumina. Indigenous.*

The berries of this shrub have an aromatic smell, and a warm sweetish taste, with a degree of bitterness, the former qualities residing in the pulp, the last in the seeds. Distilled with water they afford a considerable quantity of essential oil. The flavour and warmth are also extracted by water by infusion.

Juniper berries given in infusion prove diuretic. The essential oil retains this property ; and the spirit of juniper, or diluted alcohol impregnated with it, forming the spiritous liquor known by the name of Gin, is prescribed in a diluted state as a cordial and diuretic in dropsy.

*Offic. Prep.*—Ol. juniper. Spir. junip. comp.

Copaifera officinalis. Balsamum Copaibæ. Balsam of Copaiba or Copaiva. *Decand. Monogyn. Dumosæ,* Linn. *Leguminosæ,* Juss. *South America.*

Balsams are resinous juices, with an intermixture generally of an essential oil, and containing always a portion of Benzoic acid. The resinous juice of copaiba does not contain this acid, hence the name of Balsam is improperly applied to it. It is the produce by exudation from incisions made in the trunk of the tree. It flows thin, but becomes thick and tenacious ; is transparent, with a yellow tinge ; has a peculiar smell, not disagreeable, and a pungent bitter taste. It is insoluble in water, soluble in alcohol, and in expressed and essential oils, and with alkalis forms a kind of saponaceous compound. Distilled with water it affords nearly half its weight of an essential oil, an insipid resin being the residuum.

Balsam of Copaiba increases the urinary discharge, and communicates to the urine a violet odour. In too large a dose it is liable to excite inflammation of the urinary passages. From its power of stimulating these parts, it frequently proves successful in the cure of gleet, where the inflammation has entirely subsided, and the discharge continues from weakness of the exhalants or absorbents of

the urethra. It has also been given in leucorrhœa, and in hæmorrhoidal affections. More lately it has been used with success in the treatment of gonorrhœa, particularly in combination with cubebs, (page 148). Its dose is twenty or thirty drops twice or thrice a-day, given in the form of a bolus, or, what is preferable, as remaining more easily on the stomach, and less irritating, diffused in water by the medium of mucilage. In a large dose it produces a degree of intoxication, with a vibratory feeling in the brain.

Pyrola umbellata. Winter Green. *Decandria, Monog. Ericineæ,* Juss. *Herba. India, North America.*

This is a low evergreen plant which grows in forests. The leaves have a sweet taste, with some bitterness; the stalks and roots are astringent. The decoction of the shrub contains a portion of tannin and of bitter extractive. It is used warm as a diaphoretic, cold as a diuretic; in dropsy, strangury and nephritis, some benefit is said to be derived from it.*

Pinus sylvestris. P. abies. P. larix. P. balsamea. *Monœcia, Monadelphia, Coniferæ. Terebinthina. Oleum Terebinthinæ.*

From the family of pines a number of substances used in medicine are obtained. The principal of these are as follows:

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| *Pinus Sylvestris,* | Scotch Fir. |
| *Terebinthina vulgaris,* | Common turpentine. |
| *Oleum Terebinthinæ,* | Oil of turpentine. |
| *Resina flava,* | Yellow resin. |
| *Pix liquida,* | Tar. |
| *Pix nigra,* | Black pitch. |
| *Pinus abies,* | Spruce Fir. |
| *Thus, sive Abietis resina,* | Common frankincense. |
| *Pix Burgundica, sive Pix abietina,* | Burgundy pitch, or Resin of the spruce fir. |
| *Pinus larix,* | Larch. |
| *Terebinthina Veneta,* | Venice turpentine. |
| *Pinus balsamea,* | Balm of Gilead Fir. |
| *Terebinthina Canadensis,* | Canadian balsam. |

Of these species of pine the first is a native of this country, and it and the second are common throughout the north of Europe: the larch grows on the hilly parts of the south of Europe, and is now naturalized with us; the last species is a native of Canada. All the substances enumerated, excepting tar and pitch, are either forms of or procured from the resinous juice which comes from these species of pine, either by natural exudation, or in consequence of incisions made in the trunk of the tree. The latter method makes the juice flow in greater quantity; and if the wounds are made successively in different parts of the bark, and not very deep into the wood, the tree will live for many years, affording every summer a constant stream of juice. On exposure to the air this juice becomes thick,

* The infusion is made by pouring one pint of boiling water upon ʒj of the plant. This may be taken in doses of from ℥ij to ℥iv. It has also been administered in tincture, in doses of from ʒj to ʒij.—B.

and frequently solid, forming the different kinds of turpentine. These are usually of a yellowish colour, with a strong odour, and a warm bitterish taste; they consist of resin, and an essential oil. When exposed to heat they are decomposed, the oil rises in vapour and may be collected; it is Oil of Turpentine; the resin remains. Such are the products which may be procured from any of the pines, but their properties differ somewhat as obtained from different species.

*Pinus Sylvestris.* Scotch fir.—The juice is thick and turbid, with an offensive odour; it is the common turpentine. It contains less essential oil than some of the other turpentines, but being the cheapest and most abundant, it is from it principally that oil of turpentine is distilled. Heat is applied to the turpentine, which has a portion of water added to it to prevent the temperature from rising too high, and the oil distils over. The residuum, after this distillation, is the common White or Yellow Resin; it seems to contain part of the water combined with it, for if the distillation be conducted without adding water, instead of being opaque it is clear, and darker coloured. Yellow resin has little smell or taste, but appears, from the practice of the farriers, who give it to horses, to have some degree of diuretic power. It is only employed in the composition of ointments and plasters, which it renders more adhesive, and perhaps more stimulating. Various compositions of this kind have a place in the Pharmacopœias, as the Ceratum Resinæ, or Unguentum Resinosum, long known by the name of Basilicon, the Emplastrum Resinosum, and others. It is from the wood of the Scotch fir that tar and pitch are chiefly obtained. The wood, in billets, is heaped into a pile, which is covered with turf, and kindled at the top; it burns slowly, the resin is melted out, and sinks into a cavity below the pile; it is mixed with empyreumatic oil, the charcoal of the wood, and a portion of empyreumatic acetic acid, forming a thick black fluid known by the name of Tar. This fluid is a stimulating diuretic and diaphoretic. Two preparations, Aqua picis liquidæ, and Unguentum picis liquidæ, are made from it, afterwards to be noticed. By boiling, Tar loses its oil and acid, and becomes solid; it is then Pitch, (Pix nigra,) which is sometimes employed as a stimulating external application; according to Dr. Bateman it is also serviceable, taken internally, for ichthyosis.

*Pinus abies.* Spruce fir.—The juice which spontaneously exudes from the Spruce fir hardens into brittle masses, brownish or yellowish on the outside, internally of a lighter colour, having little smell, but an acrid and somewhat bitter taste. This is the common Frankincense or Thus: it is used in the preparation of several plasters. The juice, obtained by incisions through the bark, concretes into what is named Burgundy pitch, which is more impure and more acrid; it has, when genuine, a very peculiar odour, by which it is easily distinguished. It is brittle when cold, but assumes a tenacious viscidity when heated, and is hence much used to form adhesive and gently stimulating plasters.

*Pinus larix.* Larch.—The juice of the larch, as it exudes, is semi-pellucid, of a yellowish colour; it has a strong peculiar odour, and a bitter pungent taste; it is named Venice turpentine. It con-

tains a large quantity of essential oil. It has already been noticed as forming the basis of a powerful cathartic enema.

*Pinus balsamea.* Balm of Gilead fir.—The resinous juice which exudes from this tree is named Canadian balsam, an improper term, as it contains no benzoic acid. It is of a light yellow colour, tenacious, and, like the other turpentines, highly inflammable. By age it becomes thicker; its smell is agreeable; its taste pungent. It possesses medicinal virtues similar to those of copaiba, and is used for the same purposes. It seems to be the purest of the turpentines. Its dose is 40 or 50 drops.

Of all the substances derived from the pines, the Oil of turpentine is the most energetic in medicinal action. Its purgative power has already been taken notice of; it is here to be considered as a diuretic. This oil is light, limpid and volatile, has a strong penetrating smell and a very pungent taste; unlike the other essential oils, it is but sparingly soluble in alcohol. It is a powerful stimulant of the urinary organs, especially when given in small doses of from 10 to 40 drops; in larger quantity it passes off by its purgative action. It communicates to the urine a violet odour. It has been employed in gleet in a dose of 5 drops to 10. It is, however, seldom used as a diuretic, since there is always a risk of its producing strangury or inflammation. It is, as shall afterwards be shewn, the most powerful of anthelmintics.

Pistacia terebinthinus. Chio or Cyprus Turpentine. *Diœc. Pentand. Amentaceæ*, Linn. *Terebinthaceæ*, Juss.

The Chio turpentine resembles the turpentines of the pines, but is more limpid, fragrant and grateful; its powers are the same, but not being easily procured, it is never used.

### DIURETICS FROM THE ANIMAL KINGDOM.

Meloe vesicatorius. Cantharis Vesicatoria. Spanish Fly. Lytta Vesicatoria. Blistering Fly. *Coleoptera.*

This insect is found adhering to the leaves of certain plants in Spain and Italy; they are detached by shaking the branches, are killed by being exposed to the vapours of vinegar, and are then dried in the sun. They are of a rich lively green colour; have a faint unpleasant smell, and a taste slightly acrid. Their acrid matter is extracted both by water and alcohol. Robiquet, by a careful analysis, obtained from cantharides a volatile oil and a white crystalline substance, to which the active properties are owing; the latter he named Cantharidine. It is in white scales, insoluble in water, but soluble in alcohol and ether; the smallest particle of it dissolved in oil forms a liquor which, applied to the skin, quickly raises a blister; the oil communicates the odour.

Cantharides inflame and excoriate the skin, and are hence used as the basis of the common vesicatories. Their active matter appears to have a peculiar determination to the urinary organs, as even from external application strangury is sometimes induced; and a small dose of the cantharides internally administered is liable to act

with much violence on the kidneys and bladder, producing inflammation and a discharge of bloody urine. In dropsy it has been given as a diuretic, in a dose of one grain once or twice a-day, continued for some time, but it does not appear to be a safe or manageable diuretic : it has been prescribed in a similar dose in obstinate gleet and leucorrhœa, and in retention of urine arising from debility of the body of the bladder, or in the opposite affection of incontinence of urine. It is principally in the latter of these affections that the internal administration of cantharides is attempted,—where the inability to retain the urine arises from weakness of the sphincter vesicæ, a state which the cantharides by its local stimulant operation is adapted to remove. Its action requires to be moderated by the free use of diluents. It has also been employed as a stimulant in amenorrhœa. It is still more extensively used externally as an epispastic, an application of it to be afterwards noticed.

Cases of poisoning sometimes happen from cantharides. If taken in a dose of ten grains it produces violent irritation of the alimentary canal and urinary organs ; thirty or forty grains have occasioned death. Oil is not, as was supposed, an antidote, but rather assists its action. Emetics should be employed, and afterwards draughts containing opium or camphor. Oleaginous and mucilaginous injections into the bladder relieve the strangury.

[Aurum. Gold. (Page 130.)

The diuretic properties of this metal have already been noticed when treating of it under the head of tonics.—B.]

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## CHAP. X.

### OF DIAPHORETICS.

Diaphoretics are those medicines which increase the natural exhalation by the skin. When they excite this so copiously as to produce sweat, they are named Sudorifics. The operation of both is the same, differing only in degree ; diaphoretics in doses sufficiently large acting as sudorifics, and sudorifics in diminished doses, or under peculiar circumstances, occasioning only diaphoresis. The fluid effused too is in both cases alike, being chiefly the watery part of the blood, with a slight impregnation of saline matter. In the one case it is discharged more slowly, and therefore passes off in the state of vapour ; in the other it is discharged copiously from the exhalant vessels in the liquid form.

The operation of these medicines is not obscure ; the natural exhalation is merely increased ; the action of the exhalant vessels on the surface must therefore have been augmented, and the substances belonging to this class must be those which stimulate these vessels.

Of stimuli of this kind external heat affords an example ; it is di-

rectly applied to the vessels, and must occasion in them increased action; hence it often produces sweat, and always promotes the action of sudorifics.

The same effect may be produced by a different operation,—by increasing the general force of the circulation; this propelling the blood into the minute vessels more forcibly, acts as a stimulus on the exhalants, and increases their discharge. Hence violent muscular exercise is attended with copious sweating.

In one or other of these modes the medicines belonging to this class operate,—either directly stimulating the cutaneous exhalant vessels, or indirectly communicating to them increased action, by increasing the force of the circulation.

The saline diaphoretics seem to act in the former manner; they have little or no action on the vascular system, neither increasing the velocity nor force of the circulation; their action therefore is exerted on the stomach, and thence communicated to the vessels of the skin. Perhaps they may likewise be absorbed into the mass of blood, as they readily pass with the chyle, or enter the absorbent vessels, and may act more directly on the cutaneous vessels.

Those diaphoretics, on the contrary, which are more stimulating, probably act by increasing the force of the vascular system, as they usually augment the force and frequency of the pulse previous to occasioning sweat.

Diaphoresis is not, however, the necessary consequence of the circulation being increased in force; for it often happens that the pulse is frequent and hard, when the skin remains dry. In this case there seems to exist a constriction of the exhalants sufficient to resist the impetus of the blood, and whatever can remove this will favour sweating. Diaphoresis, therefore, it may in general be said, will follow from increased vascular action, when the exhalants of the skin are not morbidly constricted; and it will take place still more copiously when the circulation is increased in the larger vessels, while the exhalants are relaxed. On this view is to be explained the operation of tepid diluents, and of external warmth in promoting sweat, the tendency of both being to increase the force of the circulation, and at the same time occasion relaxation of the cutaneous vessels. From producing the latter effect too, small doses of emetics are favourable to diaphoresis; and from the same principle, the diaphoretic operation of the combination of opium with ipecacuan, or the preparations of antimony, may be accounted for; the primary effect of the opium being to increase the action of the vascular system; that of the ipecacuan or antimony, by its nauseating operation, to diminish the action at the surface, as is apparent from the paleness of the skin, and the sense of coldness with which nausea is attended. Hence the superiority of this combination in sudorific power.

The primary effects of diaphoretics are to evacuate the watery part of the blood, and thus lessen the quantity of it in the circulating system; to determine the blood to the surface from the internal parts; to increase the action of the absorbents, and to remove spas-

modic stricture of the cutaneous vessels, and render the skin moist and relaxed.

It is doubtful whether the first of these effects takes place to any extent ; for, during sweating, there is generally considerable thirst : as much fluid may therefore be taken in as will supply what is thrown out ; and besides, the other fluid secretions, particularly that of urine, are diminished during the operation. It is probable, therefore, that little alteration takes place in the quantity of fluid contained in the body from the action of diaphoretics ; and we can scarcely, in any case, ascribe any beneficial effects they produce to this cause.

The last effect is perhaps the most important ; at least it is on this principle,—the removing spasmodic stricture of the cutaneous vessels,—that the efficacy of diaphoretics in inflammatory diseases has been explained. In such affections the skin is dry, and the external heat augmented ; but when diaphoresis has been induced, the state is removed, and the skin remains moist and cool. It is with the view of producing these effects that diaphoretics are used in synocha, acute rheumatism, and in the various phlegmasiæ.

Several circumstances contributed to lead physicians to the free use of diaphoretics in fever. The skin is generally dry and hot ; and it was often observed, that a spontaneous salutary crisis is marked by diaphoresis, or even by a copious sweat. Hence it was concluded, that by following the path nature pointed out, and inducing this relaxed state of the vessels of the skin, the disease might be removed. Theory too had its influence in carrying this practice to an immoderate extent, fever being supposed to arise from the presence of morbific matter in the system, and sweating being an evacuation by which it was supposed to be discharged. The limits to the practice have long been established ; little advantage appears to be derived from it in the treatment of fevers of the typhoid type, and it is principally in the phlegmasiæ that it is employed, in inflammatory catarrh particularly, and in acute rheumatism.

As evacuating the serous part of the blood, and as promoting absorption, sudorifics have been sometimes employed in the different species of dropsy, especially in anasarca, in which the circulation in the extreme vessels on the surface is more or less languid. Cases occur where it is not easy to increase the discharge by urine, and in these sweating has been had recourse to as less debilitating than purging, the only other evacuation that can be excited with advantage. It has been remarked, too, that the operation of diaphoretics, when it has been excited, has been accompanied by an increase in the quantity of urine, a proof of absorption having been promoted. It is difficult, however, to excite sweating in dropsy, and the practice is rarely attempted.

By determining to the surface, and preserving a gentle diaphoresis, the remedies of this class are found serviceable in asthma, dyspepsia, habitual diarrhœa, chronic dysentery, and chronic rheumatism.

In various obstinate cutaneous affections, as herpes and lepra, advantages have been derived from the use of diaphoretics, probably from altering the morbid state of the extreme vessels on the surface.

The use of the warm bath, and the antimonial and mercurial diaphoretics, are found more particularly serviceable in such affections.

Several circumstances require to be attended to in the administration of sudorifics. If the disease is inflammatory, the action of the vascular system strong, and the skin dry, with great heat on the surface, those which are of the stimulating kind are to be avoided, as, if they fail in producing sweat, they may aggravate the symptoms. The free use of warm diluents is proper, and even necessary, under the operation of full sweating. The patient should be covered with flannel, not only as preserving the temperature more uniform, but also as it absorbs the moisture, which would otherwise carry off the heat too rapidly, and cool the surface. The covering ought rather to be light, as there is no necessity for much external warmth. Too much heat, especially when unaccompanied by humidity, sometimes prevents sweating, probably by stimulating the exhalant vessels, and increasing their force of resistance. It is promoted by partial fomentation, as the application of flannel dipped in warm water, and pressed out, to the feet. Lastly, care is to be taken to avoid the application of cold, either by the admission of cold air to the surface, or the drinking of cold water while the sweat continues, or for some time after it has ceased. When the sweat is to be checked, it is best done by drying the skin, removing the patient into dry flannel, diminishing the covering, and allowing the hands and arms to be exposed to the air.

The particular diaphoretics may be arranged according to the affinity in their operation, as they operate by increasing the action of the vascular system, or as they act without any sensible stimulant operation, though it is somewhat difficult to trace the distinctions of these, or even with regard to every individual, to assign the kind of action it exerts. The saline diaphoretics act principally in the latter mode; the vegetable diaphoretics in the former.

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## DIAPHORETICS.

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| Ammoniæ acetas. | Camphor. |
| ———sub-carbonas. | Guaiacum officinale. |
| ———bicarbonas. | Daphne mezereum. |
| ———murias. | Laurus sassafras. |
| Calomelas. | Salvia officinalis. |
| Antimonium. | [Eupatorium perfoliatum.—b.] |
| Opium. | [Asclepias tuberosa.—b.] |

Ammoniæ acetas. Acetate of Ammonia.

All the ammoniacal salts are supposed to have a diaphoretic power. The acetate is the one which has been principally used; its solution (Aqua Acetatis Ammoniæ) having been celebrated under the name of Spirit of Mindererus (Spiritus Mindereri) as a diaphoretic in febrile affections. An ounce is given every hour or two, and

its operation is promoted by tepid diluents and the sweating regimen. As it produces no increase of vascular action, it has been supposed well adapted to exhibition in inflammatory fevers, as synocha and acute rheumatism, and it is in such cases that it is usually employed. Its diaphoretic power, there is reason to suspect, is not very great; but it may be rendered more active by its operation being promoted by the addition of small proportions of opium and antimony. Externally it is used as a discutient, and sometimes as an application to inflamed parts, as in gonorrhœa, in a state of great dilution. Twenty drops of it in a glass of water have some effect in diminishing intoxication.*

Ammoniæ sub-carbonas. Sub-carbonate of Ammonia.—Of this salt some notice has been taken as an antispasmodic; it is also used as a diaphoretic. It is emloyed either in the solid form, or in the state of the officinal solution; its operation is promoted by the sweating regimen. It has been thus given in catarrh and bronchitis, but is seldom used. As a stimulant, the solution, combined with a portion of alcohol and fragrant essential oil, (Spirit. ammon. aromatic.) is given in languor or faintness. The concrete salt is applied to the nostrils, forming what is named the pungent smelling salt.†

Ammoniæ bicarbonas. Bicarbonate of Ammonia.—The Dublin College have introduced this salt into their Pharmacopœia, as a more convenient form of ammonia for internal administration than the sub-carbonate. The alkali in it being more completely neutralized, the taste of the salt is milder; it is also not liable to alter in composition by exposure to the air. As a diaphoretic its action is weaker, but this only renders a larger dose necessary. According to Dr. Barker, it is given in a dose of from six to twenty-four grains, dissolved in cold water. It may be used likewise as an antispasmodic and antacid.

Ammoniæ murias. Muriate of Ammonia. Sal-Ammoniac.

This salt is prepared in various modes, on a large scale, for the purposes to which it is applied in the arts. In Mr. Astley's process, animal substances are steeped in a strong solution of muriate of magnesia, and then exposed to such a heat as causes a slow combustion. The decomposition of the animal matter evolves ammonia, with which the muriatic acid combines, and muriate of ammonia is sublimed. In another process the ammoniacal liquor obtained in the manufacture of coal gas is used, and the salt is also procured by washing soot, which affords sulphate of ammonia, and heating this with muriate of soda, the two salts are decomposed by

* *Incompatible Substances.* Acids, potash and soda and their carbonates, magnesia, lime water, sulphate of magnesia, perchloride of mercury, nitrate of silver, sulphate of iron, zinc and copper, and the acetates of lead.—B.

† *Incompatible Substances.* Acids, fixed alkalies, and their carbonates, lime, magnesia, alum, supertartrate of potash, and all the acidulous salts, sulphate of magnesia, submuriate and oxymuriate of mercury, superacetate of lead, tartarized iron, and the sulphates of iron and zinc. If it be added to decoctions and infusions, they must be previously cooled.—B.

double affinity, the sulphuric acid uniting with the soda, the muriatic acid with the ammonia, and the muriate of ammonia is sublimed. Muriate of ammonia is obtained by sublimation in a solid dense mass of a striated texture, somewhat ductile and semi-transparent. It is soluble in about three parts of cold water, and may be crystallized from its hot solution. In medical practice it is little employed. It has been supposed, in the dose of one drachm, to act either as a diuretic or diaphoretic, according to the mode in which it is administered; the first effect being obtained when the surface of the body is kept cool; the other when external warmth is applied, with the use of tepid diluents. It is also applied externally as a discutient to indolent tumours, dissolved in distilled vinegar, with sometimes the addition of a little alcohol; and a similar solution is used as an application in some forms of inflammation, to chilblains, and to some cutaneous eruptions. But it has a place in the Pharmacopœias principally as being employed in pharmacy.*

Calomelas. Sub-murias Hydrargyri. Calomel. Sub-muriate of Mercury.

This preparation of mercury is sometimes employed to obtain its action on the cutaneous vessels; and in certain diseases, particularly eruptions on the surface and chronic rheumatism, has been supposed to prove useful by increasing the insensible perspiration. Combined with opium, or with guaiac, it has been supposed to exert a still greater degree of diaphoretic power.

Antimonium. Antimony.—A sympathy appears to exist between the stomach and the surface of the body, in consequence of which the state of the one is to a certain extent communicated to the other; the nauseating effect, for example, of emetics being accompanied with diminished action at the surface. This sympathetic affection is apparently produced by the preparations of antimony; and some of them, particularly the oxide of antimony with phosphate of lime, and the tartrate of antimony and potash, are hence employed as diaphoretics in febrile affections. The former, which is considered to be the same with the celebrated fever powder of Dr. James, has long had a high reputation as a diaphoretic, more particularly in continued fevers; but, as has been already remarked, its operation is irregular, and often it is altogether inert, (p. 177). Its dose is from 3 to 8 grains; yet Dr. Duncan gave it in doses of a scruple several times in a day without any apparent effect. The tartrate of antimony and potash, in divided doses of one-fourth or one-half of a grain, is more certain and manageable, and combined with opium forms a powerful diaphoretic. It is given dissolved in wine, forming the Vinum Tartratis Antimonii.

Opium.—Opium produces diaphoresis, particularly when its ope-

* *Incompatible Substances.* Sulphuric and nitric acids, potash and its carbonate, carbonate of soda, lime, magnesia, and superacetate of lead, nitrate of silver, and all the metallic salts whose bases form insoluble compounds with muriatic acid.—B.

ration is promoted by diluents and external warmth, and in large doses it excites even profuse sweating. It is difficult, however, to employ it alone as a sudorific, from its narcotic power being necessarily exerted at the same time. But by combination with antimony or ipecacuan, a modification of power is produced, more important perhaps than any other arising from the combination of remedies: the narcotic operation of the opium is counteracted, the nauseating effect of the ipecacuan or antimony is also diminished, and we obtain a sudorific more powerful and certain than any other. In the combination with antimony, thirty-five drops of antimonial wine are added to twenty-five of tincture of opium. The combination with ipecacuan is still more powerful. It is an officinal preparation, (Pulvis Ipecacuanhæ et Opii,) and consists of one part of ipecacuan, one of opium and eight parts of sulphate of potash: these are rubbed together into a fine powder, the sulphate of potash rendering this more easy by dividing the opium and lessening its tenacity. This has long been celebrated as a sudorific, under the name of Dover's Powder, and is the medicine which is employed where copious sweating is to be induced, as in acute rheumatism, in anasarca, and in every other disease in which this indication is to be fulfilled. Its medium dose is ten grains, (containing one grain of opium and one of ipecacuan,) given generally in a bolus; its operation is promoted by tepid diluents and external warmth, the patient being confined to bed. If it fail in producing sweat, other five grains may be given at the end of an hour, and sometimes even it is necessary to give a larger dose. When it operates, the sweating is generally profuse, and by proper management can be kept up for several hours. The power of the combination probably depends on the joint action of the opium and ipecacuan, the former increasing the force of the circulation, while it also produces relaxation at the surface, and the latter aiding this effect by its action, propagated from the stomach to the surface of the body, diminishing the resistance in the exhalant vessels. Such is the effect of this modification, that the combination can be given with safety in pure inflammatory affections, attended with increased vascular action, where the exhibition of opium alone would be attended with hazard.

Camphora.—Camphor has been employed as a diaphoretic in acute rheumatism, in different forms of fever, and in several of the exanthemata, particularly small-pox, in a dose of from five to fifteen grains; but its operation is not sufficiently certain when it is given alone. Sometimes it is combined with nitre, with antimonials, calomel, or opium.

Guaiacum officinale. Guaiac. *Decand. Monogyn. Gruinales,* Linn. *Rutaceæ,* Juss. *Lignum et Gummi-resina. South America and West Indies.*

The wood of this tree, and a concrete resinous substance obtained by exudation from incisions in its trunk, are the parts of it used in medicine.

The wood is hard and heavy, of a yellowish colour, has little smell,

and a slightly warm bitter taste. Its virtues depend on the small portion of acrid resinous matter which it contains. Decoction of Guaiac wood was introduced into practice as a remedy in the treatment of lues venerea, and was at one time even considered capable of effecting a radical cure. It has however no such power; but it is employed as an auxiliary, and sometimes with evident advantage, in promoting the action of mercury in the confirmed state of the disease, and in alleviating the various symptoms which arise from a protracted mercurial course. It is likewise occasionally prescribed in cutaneous diseases, in scrofulous affections, and in chronic rheumatism.

The gum-resin of guaiac is obtained by exudation from incisions made in the trunk of the tree, the juice being inspissated by exposure to the sun. It is also extracted by another process, probably not without some injury, that of placing billets of the wood, bored longitudinally, across the fire; the resinous matter is melted, runs into the internal cavity, and is collected at the extremity. It is friable, of a greenish or greyish colour, variegated when it has been obtained by exudation; it has a resinous lustre, an odour somewhat fragrant, and a warm bitterish taste. It was regarded as a gum-resin, but, according to the experiments of Brande, possesses some peculiar properties, whence it has been regarded as a distinct principle. It in particular suffers changes of colour, apparently from the action of oxygen. Its powder is at first of a grey colour, but becomes green from exposure to the air; and when its solution in alcohol is decomposed by acids, the precipitate assumes various tints of colour. When mixed with the gluten of wheat it becomes of a deep blue colour. It is soluble in alcohol.

Guaiac is a stimulating medicine, proving diaphoretic in a dose of about half a drachm, and purgative in a larger dose. It is a remedy employed in chronic rheumatism, being given so as to excite sweat, or more usually in smaller doses to keep up a gentle diaphoresis. Its sudorific power is promoted by opium, or the preparations of antimony. It is given either in substance, ten or twenty grains being formed into a bolus, or diffused in water by the medium of mucilage or tincture. The tincture of it in Spirit of ammonia is more highly stimulating than that in proof-spirit, and is generally preferred. The empirical remedy known by the name of the Chelsea pensioner, which is found sometimes to cure rheumatism, is composed of Gum-Guaiac one drachm, powdered Rhubarb two drachms, Cream of Tartar one ounce, Flowers of Sulphur two ounces, one Nutmeg finely powdered, made into an electuary with one pound of clarified honey. Two large spoonfuls to be taken night and morning It is said to have cured Lord Amherst.

*Offic. Prep.*—Dec. guaiac. Tinct. guaiac. Tinct. guaiac. am. Mist. guaiac.

Daphne mezereum. Mezereon. *Octand. Monogyn. Vepreculæ*, Linn. *Thymeleæ*, Juss. *Cortex radicis. Indigenous.*

The bark of the root of this plant is the part used in medicine: the entire slender twigs of the root are, however, often found in the

shops; its taste when it is chewed for some time is acrid, but this acrimony is somewhat impaired in drying it; it is extracted by water and by vinegar. A peculiar vegetable principle has been obtained from it by Vauquelin, which he has named Daphnine, but it has not been particularly examined.

Mezereon is a stimulating diaphoretic, which has been found of service in chronic rheumatism, and in cutaneous diseases. Its principal medicinal application has been, however, in the treatment of some syphilitic affections; and it has in particular been regarded as efficacious in removing venereal nodes, and thickening of the ligaments and periosteum, and in disposing ulcerations to heal. It is given in the form of decoction, but there is much doubt as to its having any efficacy in these affections.

*Offic. Prep.*—Dec. mezer.

Laurus sassafras. Sassafras. *Enneand. Monogyn. Oleraceæ*, Linn. *Laurineæ*, Juss. *Lignum, Oleum. America.*

This wood has a moderately fragrant smell, and a sweetish aromatic taste. It affords an essential oil by distillation, and, yields to water, by infusion or decoction, its flavour and part of its taste; alcohol extracts all its virtues. It is slightly stimulant and diaphoretic. Its infusion has been drunk freely in cutaneous diseases, and in chronic rheumatism; it has even been celebrated for its efficacy in the removal of some of the symptoms of syphilis, and it is frequently added to decoctions of sarsaparilla, guaiac, and mezereon, probably without communicating any real virtue.

*Offic. Prep.*—Ol. sassaf.

Salvia officinalis. Sage. *Diand. Monogyn. Verticillatæ*, Linn. *Labiatæ*, Juss. *Folia.*

The leaves of this shrub have an aromatic smell, and a warm bitterish taste. Its aqueous infusion, drunk warm, has been used to produce sweat, or to promote the action of sudorifics; the aromatic quality of the sage adding something perhaps to the power of the warm diluent. An infusion of Melissa Officinalis, Balm, is used for the same purpose, and acts in the same way.

[Eupatorium perfoliatum. Boneset. (Page 150.)

The diaphoretic properties of the Boneset will be found noticed in the general account given of this plant under the head of Tonics. —B.]

[Asclepias tuberosa. Decumbent Swallow-wort. Pleurisy root. Butterfly weed. *Pentand. Digyn.* Nat. Ord. *Asclepiadeæ. Radix. United States.*

This plant grows in every part of the United States, but is most abundant in the Carolinas and Georgia. It flowers in June and July. The root, which is the part used in medicine, has a bitter though not unpleasant taste. Its most abundant soluble portions are a bitter extractive matter and fecula. Boiling water is its best menstruum. As a diaphoretic and expectorant the asclepias deserves a high rank

among our native medicinal productions. It has been found highly serviceable in rheumatism, catarrh, bronchitis, and the secondary stages of pneumonic inflammation. It has also been recommended as a palliative in phthisis pulmonalis. It may be given in substance and decoction. Of the former, the dose is from ℈j to ʒss. The decoction is made by boiling ℥ss of the root in a pint of water. Of this a tea-cup full may be taken several times during the day.—B.]

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# CHAP. XI.

## OF EXPECTORANTS.

Expectorants have been defined, those medicines which facilitate or promote the rejection of mucus, or other fluids, from the lungs and trachea. The theory that has been given of their mode of operation is extremely obscure and hypothetical. It has been supposed, that, in certain diseases, a greater quantity of serous fluid is thrown out by the exhalant vessels in the lungs than the absorbents can take up, and that expectorants facilitate the rejection of this fluid. But as expectoration of this kind is a complicated, and partly voluntary operation, dependent on the action of a variety of muscles, it is difficult to perceive how these remedies can produce any such effect. There are only two classes of medicines which seem capable of promoting expectoration in this manner ; powerful stimulants, which, when extreme debility is present, may promote it by giving vigour to the voluntary muscles exerted in the operation, and emetics, which, by exciting vomiting, compress the thoracic viscera, and, by calling all the neighbouring muscles into strong action, and rendering both expiration and inspiration more forcible, may facilitate the expulsion of matter from the cavity of the lungs. But these exert no specific action, and are therefore not entitled to the appellation of expectorants ; nor indeed are they usually considered as such.

If, therefore, by expectorants are understood substances capable of promoting, by some specific action on the parts concerned, the expulsion of fluid from the lungs, there appears no reason to believe in the existence of such remedies.

Dr. Cullen, after admitting the difficulty of giving a theory on this subject, supposes that the promoting of expectoration by these remedies may be owing to their " increasing the secretion of the liquid, that is, to afford a mucus ; this, as it is poured from the arteries into the follicles, being always a thin fluid, it may dilute the mucus in the follicles, and may cause it to be poured out from these in a less viscid state, and thereby render it more easy to be brought up by coughing, that is, to be more freely expectorated."

It is possible that some expectorants may act in this manner ; but the action of the different individuals belonging to the class, and es-

pecially their action in different diseases, cannot always be explained on this principle. There appear indeed to be several modes of operation, by which certain medicines promote expectoration, and which give them a claim to the title of expectorants.

In the first place, by removing constriction on the exhalant vessels in the lungs, expectoration will appear to be promoted. From this constricted state the usual quantity of fluid is not thrown out to lubricate these parts; expectoration must, of course, be more scanty than usual; and if medicines are given capable of removing the constriction, expectoration will become more copious. At the same time the disease will be at least partially relieved, as that morbid state of the vessels, from which some of its symptoms originate, is removed. It is apparently by such a mode of operation that the promoting of expectoration is of service in pneumonia, inflammatory catarrh, and asthma, the principal diseases in which expectorants are employed.

The remedies by which such an effect is induced, according to this mode of operation, must be principally those belonging to the class of antispasmodics, or those which have the power of inducing nausea, either of these being capable by their action of removing constriction of the exhalant vessels. The antimonial preparations, which are perhaps the most powerful expectorants, appear to operate on this principle. Opium must operate in a similar manner.

It is not possible, however, to explain the effect of all the medicines ranked as expectorants, from this mode of operation; on the contrary, some of them seem to act on a very different principle. In certain diseases, as in humoral asthma and catarrhus senilis, there is, from debility of the exhalants, or from deficient action of the absorbents, an increased quantity of fluid in the lungs. Some medicines have been supposed to promote its expectoration; but it is more probable that any relief they afford is by diminishing its quantity. There appear to be certain substances peculiarly determined to the pulmonary vessels, as their odour is discernible in the air expired. These may stimulate the exhalant vessels through which they pass, and by this stimulus may moderate the effusion of fluid, and thus render the expectoration of the remainder more easy. Any medicine promoting absorption of the effused fluid will, to a certain extent, have a similar effect. There is another mode, too, in which the quantity of fluid in the lungs may be diminished, that of determining to the surface of the body, so as to increase the insensible perspiration; and it is probable, that some of the substances which have been used as expectorants, particularly those connected with the class of diaphoretics, owe what virtues they have to this operation.

Expectorants are not, then, to be regarded as medicines which assist the rejection of a fluid already secreted, or which, according to Dr. Cullen's opinion, alter its consistence, and render it thin where it is too viscid, by which its expulsion is rendered more easy. They are rather to be considered either as increasing the natural exhalation where it has been deficient, in which case the expectoration that takes place is the consequence of this, and not the cause of any relief that is afforded; or as diminishing the quantity of fluid where it

is too copious, either by stimulating the exhalant vessels, increasing the action of the pulmonary absorbents, or determining to the surface of the body, by which diminution the expulsion of the remaining fluid is facilitated. On one or other of these principles we may, with sufficient probability, explain the effects of this class of remedies, and their application to the treatment of diseases.

From this diversity of operation it is evident that expectorants will prove useful in opposite diseases, and that in some morbid affections advantage may be derived from those belonging to one division, but not from the others.

In pneumonia, where the expectoration is deficient, as this arises not from any deficiency of power to expectorate, but from a diminution of the fluid usually thrown out into the bronchiæ, owing to a constricted state of the exhalant vessels, it is evident that those expectorants which act by removing such a state will be most useful, while such expectorants as stimulate these vessels would be rather prejudicial. Hence the utility in this case of nauseating doses of tartrate of potash and antimony, or of ipecacuan; and similar advantage may be derived from the use of these remedies in catarrh, and perhaps also in spasmodic asthma. On the contrary, where the effusion of fluids into the bronchiæ is too great, as in humoral asthma, or in the chronic catarrh to which old people are subject, those expectorants which are more directly stimulant, as the different balsams, and several of the gum resins, as myrrh or ammoniacum, so far as they have any efficacy, or those which promote absorption, as squill or foxglove, will be found more useful. In considering the particular expectorants, they may be arranged as nearly as possible according to these subdivisions.

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## EXPECTORANTS.

ANTIMONIUM.
IPECACUANHA.
DIGITALIS PURPUREA.
NICOTIANA TABACUM.
SCILLA MARITIMA.
ALLIUM SATIVUM.
POLYGALA SENEGA.
AMMONIACUM.
MYRRHA.
MYROXYLON PERUIFERUM.
———— TOLUIFERUM.
STYRAX BENZOIN.
——— OFFICINALE.
AMYRIS GILEADENSIS.
TUSSILAGO FARFARA.

ANTIMONIUM.—Antimony, it has been already remarked, is in use as an expectorant, and probably operates by its power of removing constriction of the exhalants, and thereby favouring the effusion of fluid into the mucous cells of the lungs, when from an inflammatory state this secretion has been suppressed. It, of course, then apparently causes expectoration. The form of it which is chiefly employed is that of the tartrate of antimony and potash. It is used in pertussis and pneumonia, and in some forms of asthma and catarrh, in the dose of one-eighth of a grain, repeated every second or third

hour. It is also frequently combined with squill and other expectorants, to promote their operation.

Ipecacuanha.—Ipecacuan, operating in the same manner nearly as antimony, has, like it, been used as an expectorant in a dose of two or three grains. It is, however, less frequently employed. Advantage is sometimes derived from it in this dose, continued for some time, in chronic asthma.

Digitalis purpurea.—Foxglove is employed with advantage in humoral asthma, dyspnœa aquosa, and in catarrhus senilis, obviously from its power of promoting absorption, by which it removes the fluid accumulated in the lungs from diminished action of the absorbents. By diminishing the quantity of this fluid, it facilitates the expectoration of the remainder: it hence appears to act as an expectorant, and relieves the difficulty of breathing, and the irritation to which this accumulation gives rise. In such cases it is proper to give it rather in small doses, than to push its operation to any great extent; a grain of the dried leaves, twenty drops of the tincture, or half an ounce of the infusion daily, will be a sufficient dose.

Nicotiana tabacum.—Tobacco has been celebrated as an expectorant in chronic catarrh and humoral asthma, under the form of the watery extract, the dose of which is two or three grains. Its general action being similar to that of foxglove, it probably operates in these morbid affections on the same principle, though it is much inferior in efficacy.

Scilla maritima.—Squill, the history of which has been given as a diuretic, is one of the principal expectorants. It is used more peculiarly in those cases where there is an accumulation of the pulmonary mucus; hence it probably operates by its power of promoting absorption, diminishing the quantity of fluid effused, and thus facilitating the expectoration of the remainder. By stimulating the exhalants of the lungs where they are in a debilitated state, it may also lessen the secretion where it is too abundant. In inflammatory states of the system, where, from constriction of the pulmonary vessels, the exhalation is diminished, it is less useful; it has even, from its acrimony, been considered injurious in pneumonia, unless when the state of active inflammation has subsided, or when its stimulating operation is diminished by combination with nitre, or with tartrate of antimony. As an expectorant it is also used in pertussis; and when the removal of that disease is attempted by exciting vomiting at intervals, it is the emetic usually prescribed. In all these cases it is used under the form of the vinegar or the syrup of squill. The squill pill is used in chronic catarrh.

Allium sativum. Garlic. *Hexand. Monogyn. Liliaceæ,* Linn. Juss. *Radix. South of Europe.*

The bulbs of the root of this plant have, when recent, a fetid smell and acrid taste. By being long kept they become shrivelled

and inert. Their taste and smell are extracted by water by infusion; by decoction they are nearly lost. By distillation they afford an essential oil, odorous and acrid, heavier than water, and of a thick ropy consistence; it appears to be the principle in which the characteristic properties of garlic reside.

Garlic has an analogy to squill in its qualities and operation; it acts as a diuretic, diaphoretic, and expectorant; hence its use in dropsy, rheumatalgia, and humoral asthma: it has also been employed in the treatment of intermittent fever; and as a stimulant in dyspepsia. Its dose is half a drachm or two scruples, swallowed whole, or made into pills with soap. Externally, garlic bruised is used as a stimulant and rubefacient: it is applied to the soles of the feet to relieve coma in fever; its juice is sometimes introduced into the ear in cases of deafness. The Onion (Allium Sativum) has, like garlic, some power of increasing the secretions.

POLYGALA SENEGA. Seneka. Rattlesnake-root.

Seneka has been employed as an expectorant in pneumonia, after the highly inflammatory stage of the disease has been subdued, and also in pertussis and chronic catarrh. Its dose in substance is from 10 to 20 grains, but it is generally used in the form of decoction. As it operates also as a diuretic, it is probable that its efficacy depends on its power of increasing absorption, and hence that it is more adapted to those cases where there is an accumulation of fluid in the bronchiæ than to affections of an opposite nature.*

AMMONIACUM. Ammoniac. Heracleum Gummiferum. *Pentand. Digyn. Umbelliferæ. Gummi-resina.*

THIS gum-resin is brought from Persia by the way of Egypt and the East Indies; the tree which produces it has not been accurately described. Wildenow, however, succeeded in raising, from the seeds often found mixed in the gum-ammoniac of the shops, a vegetable which he has described, and named Heracleum Gummiferum: and the London and Edinburgh Colleges have, on his authority, inserted it as the plant which affords ammoniac. Dr. Duncan, however, has shewn that the descriptions given by travellers of the plant, whence the ammoniac is procured in Persia, by no means agree with the plant of Wildenow. It appears that the gum-resin is yielded by exudation. It is in large masses, or, when of the best quality, in round fragments, yellow on the surface, and white within. It has a faint smell, and a nauseous taste. It is partly soluble in water, alcohol, ether, and vinegar. Water triturated with it forms a milky-like

* In this country the Seneka is a much more popular article than it appears to be in Europe from the representation of our author. As a remedy in croup particularly, it has long sustained with us a very high character, and it is also in common use in many of the forms of pneumonic inflammation. From its very stimulating character it is evident that it can only be administered with safety in the secondary stages of these diseases, after blood-letting and other evacuations have been liberally premised. The best form in which it can be given is that of decoction, prepared from ʒss of the bruised root boiled in ℥viij of water down to ℥iv. In croup, a tea-spoonful of this may be given every hour or half hour, according to circumstances. It is proper to state that Dr. Archer of Maryland first suggested this practice.—B.

mixture, from which a resinous matter subsides. According to Braconnot it consists of resin, gum, and gluten.

Ammoniac is principally employed as an expectorant, and is sometimes prescribed in asthma and chronic catarrh, probably with little benefit. Its dose is from 10 to 20 grains, given under the form of pill, or diffused in water, and frequently combined with squill or tartrate of antimony. Sometimes it is used as an emmenagogue, combined with myrrh, or with preparations of iron. Externally it is applied as a discutient, under the form of plaster, to white swelling of the knee, and to indolent tumours, being beat into a soft mass with vinegar, and spread on leather.

*Offic. Prep.*—Emp. amm. Emp. am. cum hydr. Mist. ammon.

MYRRHA. Myrrh. *Gummi-resina.*

MYRRH is the produce of Arabia and Abyssinia; the plant which produces it is not accurately known, but is stated by Ehrenberg to be closely allied to the Amyris Kataf. Myrrh is the juice which flows from the bark. It consists of gum and resin, with a portion of volatile oil and saline matter; the resin appears to constitute its active matter. Alcohol dissolves the resin, and the solution is rendered turbid by the affusion of water.

Myrrh is an expectorant which has been regarded as too stimulating to be employed in pneumonic inflammation, but which has been often employed in asthma and chronic catarrh, and sometimes in phthisis where there is little tendency to inflammatory action. Its dose is from 10 to 20 grains: and to lessen its stimulating operation, it is not unfrequently combined with nitre, or with super-tartrate of potash. The watery extract which has been preferred by many physicians to the myrrh itself, and which is a form under which it has been used in phthisis, seems to be an injudicious preparation, as the myrrh is merely weakened in power. Myrrh is also sometimes employed in amenorrhœa, usually combined with iron. Its tincture is in common use as a stimulating application in sponginess of the gums, and sometimes also to foul ulcers.

*Offic. Prep.*—Tinct. myrrh. Tinct. al. et myrrh.

MYROXYLON PERUIFERUM. Balsamum Peruvianum. Peruvian Balsam. *Decand. Monogyn. Lomentaceæ,* Linn. *Leguminosæ,* Juss. *South America.*

THIS balsam is said to be extracted by boiling the bark and young branches of the tree with water; it has also been affirmed that it is obtained by exudation. It is thick and viscid, of a reddish-brown colour, has a strong smell, somewhat fragrant, and a bitter pungent taste. It affords a small portion of essential oil by distillation, and of acid of benzoin by sublimation. Its remaining matter is resinous. It is entirely soluble in alcohol.

Peruvian balsam is considerably stimulant. It has been employed as an expectorant in catarrh and dyspnœa, more particularly in those forms of these diseases where the secretion of pulmonary mucus is increased; and from its stimulating action on the stomach, or from a similar action on the exhalants or absorbents of the lungs, may be

attended with advantage. It has also been prescribed as a remedy in paralysis, chronic rheumatism, and leucorrhœa. Its dose is from 5 to 15 grains, and it is best given diffused by mucilage, or made into pills by any vegetable powder.

Myroxylon toluiferum. Toluifera Balsamum. Balsam of Tolu. —It is affirmed by some that this is merely a variety of Peruvian balsam; according to other authorities it is procured from a species of Myroxylon, somewhat different from the M. Peruiferum. Tolu balsam is of a resinous appearance, and has a brown colour, a fragrant odour, and a warm sweetish taste. It dissolves entirely in alcohol, and communicates its odour and taste to water by boiling. It contains a small quantity of benzoic acid, which is expelled from it by heat.

This is the mildest of all the balsams. It has been used as an expectorant, and its tincture or syrup sometimes enters into the composition of mucilaginous mixtures used in catarrh; but its powers are very inconsiderable, and it is employed principally on account of its flavour.

*Offic. Prep.*—Tinct. toluif. bal. Syr. tolut.

Styrax benzoin. Benzoinum. Benzoin. *Decand. Monog. Bicornes*, Linn. *Symploceæ*, Juss. *Styraceæ*, Rich. *Balsamum.*

The tree which affords the concrete balsam named Benzoin is a native of Sumatra. It yields it by exudation from incisions which are made in the bark of the stem. Benzoin is in brittle masses, composed of brown and white fragments; its smell is fragrant; it has little taste. It consists of resin and benzoic acid, and is therefore nearly entirely soluble in alcohol. The proportions in 100 parts are 80 of resin and 20 of benzoic acid.

Benzoin is used only to afford benzoic acid, and in the composition of the camphorated and ammoniated tinctures of opium.

Styrax officinale. Storax. *Decand. Monogyn. Bicornes*, Linn. *Symploceæ*, Juss.

The resinous juice afforded by the Storax-tree, from incisions in the bark of the stem, is, in the state in which it is imported from the Levant, very impure, from the intermixture of saw-dust, and sometimes of earthy matter. It is in masses, soft and slightly unctuous, of a brown colour, with scarcely any resinous appearance; it retains, however, a strong fragrant odour, and has a bitterish pungent taste. It consists principally of resin, with a small portion of benzoic acid; resembles benzoin in its virtues; was formerly used as an expectorant, but is now little regarded.

Olibanum, the Frankincense of the ancients, was at one time celebrated as an expectorant, but is now only employed for plasters. It is the resinous juice of the Boswellia Serrata, an Indian plant. It consists of resin, gum, and a little essential oil.

Amyris Gileadensis. Balsam of Gilead. *Octand. Monogyn. Dumosæ*, Linn. *Terebinthaceæ*, Juss. *Arabia.*

This balsam is obtained from incisions made in the bark of the trunk of the tree; it is in the form of a milky juice, highly fragrant, and is so much valued in the East, that it is said not to be imported into Europe. A coarser kind is obtained by strong decoction of the branches and leaves, of a yellow colour and thick consistence; its taste is warm and bitter, and its flavour is fragrant. What is met with in the shops under the name of Balsam of Gilead is a resinous juice, having none of these qualities, and probably the produce of a different plant. It seems little superior to the finer kinds of turpentine.

The medicinal virtues of the genuine Balsam of Gilead have been highly extolled, undoubtedly with much exaggeration. Even the inferior balsam that is said to be procured by decoction is not easily procured, so that it is never used in European practice; but its qualities seem to be similar to those of the balsam of Peru, with more acrimony.

Tussilago farfara. Colts-foot. *Syngen. superf. Compos. Corymbif.* Juss. *Folia, Flores. Indig.*

The leaves and flowers of Colts-foot infused in milk are supposed to facilitate expectoration in catarrh, but it may be doubted if they have any activity. The empirical remedy, named Pectoral Essence of Colts-foot, consists of equal parts of balsam of Tolu and the compound tincture of benzoin, with double the quantity of rectified spirit; it contains no colts-foot, and, from the stimulating ingredients, must be hurtful.

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# CHAP. XII.

## OF SIALAGOGUES.

Sialagogues are those medicines which increase the salivary discharge. This may be effected either by the mastication of substances, which, by their acrimony and pungency, excite the action of the vessels which secrete the saliva, or by the internal exhibition of certain medicines. Of the latter, mercury is the only sialagogue: and such is the certainty of this operation of it, that all its preparations, when administered in certain quantities, produce salivation to a greater or less extent.

As a class of remedies sialagogues are of little importance. The sialagogue operation of mercury, it has already been remarked, does not appear essential to its efficacy in any disease, but is regarded merely as a test of the mercury acting on the system. The acrid sialagogues, which are applied locally, by increasing the secretion of saliva, and by their pungency, sometimes relieve the pain of toothach; they have been supposed useful by the derivation they occasion in some kinds of headach; and their pungency has been believed to operate with some advantage in paralysis of the tongue, or of the muscles concerned in deglutition.

## SIALAGOGUES.

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| HYDRARGYRUS. | DAPHNE MEZEREUM. |
| ANTHEMIS PYRETHRUM. | AMOMUM ZINGIBER. |
| COCHLEARIA ARMORACIA. | NICOTIANA TABACUM. |

HYDRARGYRUS. Quicksilver.—No satisfactory explanation has been given of the peculiarity which mercury, under every form of preparation, has of exciting the secretion of the saliva. Some have remarked, that in consequence of the gravity of this metal, by which, when received into the circulation, it is disposed to retain the "direct line in which it is propelled from the heart, it is more certainly determined to the vessels of the head," a solution of the difficulty which is altogether absurd. It has likewise been supposed to act by lessening the consistence of the blood, and disposing it to pass more easily into the salivary glands, so as to increase their secretion,—an opinion equally gratuitous and imperfect. Dr. Cullen endeavoured to solve the problem, by supposing that mercury has "a particular disposition to unite with ammoniacal salts, and that such salts are disposed to pass off by the salivary glands more copiously than by any other excretion." But mercury has no peculiar tendency of this kind; and if it had, these salts are not more abundant in the saliva than in some other secretions. If another hypothesis might be hazarded, the following perhaps may afford some explanation of this singular property. The urine appears more peculiarly designed to convey matter which has been received into the circulating mass, but which is excrementitious, from the system. To pass with this fluid, it is necessary that the matter conveyed should be dissolved; and when it is so, we can discover it in the secretion by chemical tests. If there is any property connected with it which shall prevent this solution, this probably will prevent its secretion. Now, the phosphoric acid which is abundant in urine must, in this mode, counteract the secretion of mercury in any form of preparation, by forming with it a compound insoluble, and to which the slight excess of acid cannot communicate solubility. The mercury, therefore, when brought, in the course of the circulation, to the secreting vessels of the kidneys, will not pass through their whole course, but if conveyed so far as to be combined with the phosphoric acid which is secreted, will, from this combination, be incapable of being conveyed onwards, but will be retained in the composition of that part of the blood which does not enter into the secretion, and return into the circulation. It must be discharged by some other emunctory; a portion of it appears to pass off by the insensible perspiration; but the tenuity of this secretion, if the term may be employed, must be unfavourable to this mode of discharge. The salivary secretion is one by which it may be more easily transmitted; and this transmission may even be facilitated by the affinity exerted to the oxide of mercury by the muriatic acid, the soda and ammonia, which are

the chief saline ingredients in saliva; for it deserves to be remarked, that triple compounds of these substances,—a soda-muriate, and ammoniaco-muriate of mercury,—are to a certain extent soluble in water. If the mercury is thus secreted, it will of course stimulate the secreting vessels through which it passes, and increase the salivary discharge.

The increase in this discharge, effected by mercury, is attended with pain and sense of heat in the mouth, with softness and swelling of the gums, or even slight ulceration; sometimes with considerable swellings, extending over the throat and face. These effects, when excessive, are best checked by the use of opium, of purgatives, of a blister applied to the throat, and, as Mr. Pearson has recommended, free exposure to a cool dry air. From theory, the administration of sulphur, or sulphuret of potash, has been recommended.

The remaining Sialagogues act by topical application.

Anthemis pyrethrum. Pellitory of Spain. *Syngenes. Polygam. superfl. Compositæ Corymbiferæ*, Juss. *Radix. South of Europe.*

This plant is cultivated in this country, but the root found in the shops is generally imported from Spain. Its taste is hot and acrid, its acrimony residing in a fixed oil, which sulphuric ether and alcohol dissolve, forming very acrid solutions. It is a remedy which, from stimulating the salivary glands, and exciting a discharge of saliva, is used in toothach, and sometimes gives relief. It has also been chewed in palsy of the muscles of the throat.

Cochlearia armoracia. Horse-radish. *Tetradyn. Silic. Siliquosæ*, Linn. *Cruciferæ*, Juss. *Radix. Indigenous.*

The root of this plant, when recent, has a penetrating taste, with a degree of sweetness. It excites, when chewed, a sense of heat, and a discharge of saliva. Its pungency resides in an essential oil, and is lost by drying. Water and alcohol may be impregnated with it, but it is lost by boiling; and by distillation with water, a portion of oil is procured, pungent and acrid.

Horse-radish is a stimulant which, as a sialagogue, has been used in paralysis of the tongue. It has also been used internally in paralysis and rheumatism as a stimulating diaphoretic, in asthma as an expectorant, and in dropsy as a diuretic. Its dose is about a drachm of the recent root, cut in small pieces, and swallowed entire. Externally it has been applied as a rubefacient, and its syrup has been used as a remedy for hoarseness.

*Offic. Prep.*—Inf. armor. comp. Spir. armor. com.

Daphne mezereum.—The bark of the root of mezereon has a considerable degree of acrimony, so that when chewed it impresses a sense of heat and irritation in the mouth and upper part of the throat, and excites the salivary discharge. A case of paralysis of the muscles of the throat, causing difficulty of swallowing, is related by Withering, in which, from chewing frequently small pieces of mezereon, a cure was obtained.

Amomum zingiber.—Ginger-root, from its pungency, excites, when masticated, a sense of heat and increased discharge of saliva, and is sometimes, like other sialagogues, employed to remove the pain of toothach.

Nicotiana tabacum.—Tobacco, when chewed, increases the action of the salivary glands, and the same effect is produced in the usual method of smoking it. Partly from this, and partly from its narcotic operation, exerted at the same time to a certain extent, it sometimes relieves, especially in the latter mode of using it, the pain of toothach or of earach.

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# CHAP. XIII.

## OF ERRHINES.

Errhines, or Sternutatories are substances which occasion a discharge from the nostrils of a mucous or serous fluid. They operate by direct application, and generally in consequence of a slightly acrid quality. Any substance in fine powder, snuffed up the nostrils, has this effect in a certain degree ; but it is, as is to be expected, more copious as the substance is more acrid or stimulating. The discharge, as produced by different errhines, varies, in extent, and in the time during which it continues. Some also occasion a sense of heat, or even inflame the membrane to which they are applied, while others have no such effects.

It is evident that the effects of this class of remedies must be very limited, as applied to the treatment of disease. By the evacuation they occasion, it has been supposed that they diminish the quantity of fluid circulating in the neighbouring vessels ; hence they have been inferred to be useful in rheumatic affections of the muscles of these parts, and in toothach. It has even been supposed that their effects may extend to all the branches of the external carotid, and Dr. Cullen mentions, that he has, apparently from this operation, known headach, pain of the ear, and some cases of ophthalmia, cured or relieved by the use of errhines. He has likewise supposed that they may have been of use in preventing apoplexy or palsy ; this at least should, he remarks, be so far attended to, that when any approach to these diseases is suspected, the drying of the mucous discharge should be attended to, and, if possible, obviated.

# ERRHINES.

Iris florentina.
Origanum majorana.
Lavandula spica.
Rosmarinus officinalis.
Asarum Europæum.
Veratrum album.
Nicotiana tabacum.
Euphorbia officinarum.
Subsulphas hydrargyri.

Iris florentina. Florentine Orris. *Triand. Monogyn. Ensatæ,* Linn. *Irideæ,* Juss. *Radix.*

The root of this plant, freed from its outer bark, is of a white colour, has a pleasant odour, and slightly bitter taste. It is a mild sternutatory, and enters into the composition of some cephalic snuffs. It is also chewed to conceal by its odour the fetor which, in a course of mercury, is given to the breath.

Origanum majorana. Sweet Marjoram. *Didynam. Gymnosperm. Verticillatæ,* Linn. *Labiatæ,* Juss. *Herba. South of Europe.*

The leaves of this herb have an aromatic odour, and, when dried and reduced to powder, a slight errhine power.

Rosmarinus officinalis. Rosemary. *Diand. Monogyn. Verticillatæ,* Linn. *Labiatæ,* Juss. *Summitates florentes.*

The flowers and flowering tops of this plant have a fragrant odour, which resides in an essential oil. It is used as a stimulating perfume, under the form of the distilled spirit, and the powder is sometimes mixed with other errhines. *Offic. Prep.*—Ol. rosm. Spir. rosm.

Lavandula spica. Lavender. *Didynam. Gymnosperm. Verticillatæ,* Linn. *Labiatæ,* Juss. *Spicæ florentes. South of Europe.*

Lavender is cultivated in our gardens. Its flowers have a fragrant smell, and a warm bitterish taste. They yield a quantity of essential oil, which is employed in medicine as a stimulant, when combined with alcohol and other aromatics, under the form of what is named Compound Spirit of Lavender. The simple spirit, or solution of the oil in alcohol, is used as a perfume, and the dried leaves in powder are errhine.

Nicotiana.—The leaves of tobacco are in common use as an errhine, their powder forming the different kinds of snuff.

Asarum Europæum. Asarabacca.

This plant has been already noticed as an emetic, but is now retained in the Pharmacopœias only as an errhine. Its leaves possess rather more errhine power than those hitherto noticed, while they are less acrid than some other substances belonging to this class. They are on the whole, therefore, best adapted to the pur-

poses which errhines serve, and are hence employed as the basis of the officinal sternutatory powders. It is said to be the basis of Cephalic snuff.

*Offic. Prep.*—P. asar. europ.

VERATRUM ALBUM. Helleborus Albus. White Hellebore. *Polygam. Monœc. Liliaceæ,* Linn. *Colchicaceæ,* De Cand. *South of Europe.*

THE root of this plant has a strong disagreeable smell when fresh, which is lost by drying, and an acrid taste, which is retained. Snuffed up the nostrils in very small quantity it excites violent sneezing, with a sense of heat, and a copious discharge of thin mucus. It is therefore sometimes used as a sternutatory, mixed with some of the milder and more fragrant errhines. Taken internally, in the dose of a few grains, it acts as a violent emetic and cathartic. Externally, when mixed with lard, so as to form an ointment, or in the form of decoction, it is used as an application in psora and some other cutaneous diseases. Its active principle, Veratria, has been already described.

*Offic. Prep.*—T. verat. Vin. verat. Dec. verat. Ungt. verat.

EUPHORBIA OFFICINARUM. EUPHORBIA CANARIENSIS. Euphorbium. *Monœcia, Dodecandria,* (*Dodecand. Trigyn.*) *Euphorbiaceæ,* Juss. *Gummi-resina.*

THIS substance, which is of a resinous nature, is obtained by exudation from incisions in the branches of the plant producing it, a native of different countries of Africa : it is usually imported from Barbary. It is in small fragments, having scarcely any smell, but a very acrimonious taste. Its operation as a drastic purgative is so violent that it is never given internally. Its powder is the most violent of all the errhines, occasioning a copious discharge of mucus, with a sense of heat, and sometimes hæmorrhage or inflammation. Hence it is scarcely ever employed. Externally it is used as a rubefacient or vesicatory.

SUB-SULPHAS HYDRARGYRI. The Sub-sulphate of Mercury is an errhine, and has been employed in chronic ophthalmia and amaurosis ; one grain of it being mixed with a few grains of any mild vegetable powder, and snuffed up the nostrils occasionally.

# CHAP. XIV.

## EPISPASTICS AND RUBEFACIENTS.

Epispastics and Rubefacients operate nearly on the same principle, and produce similar effects, differing only in degree. They may therefore be considered as subdivisions of one class.

The term Epispastic has been applied to whatever application has the power of producing a serous or puriform discharge, by exciting a previous state of inflammation or suppuration. The term includes blisters, issues, and setons; but it is more commonly restricted to the first of these, and it is this which chiefly falls under the department of Materia Medica.

Blisters are those external applications which, by their acrimony, excite inflammation on the skin, and which, occasioning a thin serous fluid to be poured from the exhalants, separate the cuticle from the true skin, and form the appearance of a vesicle or blister.

The mode in which they produce this effect is sufficiently evident: it is to be referred to the stimulating power of the substances applied, which, exciting increased action in the extreme blood-vessels, induces inflammation, and causes the pouring out of the serous fluid with which the vesicle is filled: hence may be deduced the primary effect of these applications on the general system. By the increased action they excite, and the pain they occasion, they act as stimulants; and they may also act, it has been supposed, as evacuants, by the quantity of fluid which they cause to be poured out.

There can be little dispute by which of these modes of operation blisters are used with advantage in the treatment of diseases. The quantity of fluid discharged is so inconsiderable, while the relief obtained is often so sudden and complete, that it would be assigning a very inadequate cause for their effects, if we should ascribe these to any evacuating power.

Some have imagined that the substance of cantharides, which forms the basis of the common blistering applications, is absorbed in part by the inflamed surface, and that it is to the peculiar action of this acrid matter stimulating the system that many of the effects of blisters are owing. But there is no proof, nor indeed any reason to believe, that this absorption is uniform or frequent; the same effects are obtained from blistering applications into the composition of which cantharides do not enter, while they are not obtained from the internal administration of cantharides. The effects of blisters are therefore to be ascribed to the pain and inflammation they excite in the part to which they are applied, and the stimulus which is thence propagated to the general system.

It is a principle with regard to the living body, demonstrated by many facts, that where a morbid action exists, it may be often removed by inducing a different action, even of a morbid kind, in the same part, or in parts as contiguous to it as possible; and where

the morbid action extends to the whole system, it may be removed by one of a different kind being excited, either generally, or in any particular part of the body.

From this principle is explained the efficacy of blisters in all cases of inflammation and of spasmodic constriction ; a new inflammation being excited by the blister which occasions derivation of action. Hence, too, the advantage obtained is greater when the blister is applied as near as possible to the part affected. This principle regulates the application of blisters in pneumonia, hepatitis, phrenitis, angina, ophthalmia, rheumatism, and every other case of active inflammation. In these affections blisters are used with very evident advantage ; the local inflammation which is excited more than counterbalancing, by this operation, the stimulant effects at the same time produced.

A similar principle exists with respect to the pain excited by blisters, which may be applied to the explanation of the advantages derived from them in other diseases. It has long been remarked, that exciting one pain often relieves another, and hence blisters afford relief in toothach and other painful affections. Epilepsy and hysteria arising from irritation have been removed by blisters ; apparently from their exciting pain, engaging the attention, and diminishing the sensibility to the morbid irritation.

Lastly, blisters exert a stimulant operation on the general system, and raise the vigour of the circulation. Hence their utility in fevers of the typhoid kind, where extreme debility prevails. From their peculiar operation, too, they are the only remedy that can be used to obviate the local inflammation of the brain, or other parts, that sometimes exists in fevers of this kind, as they contribute to resolve it without reducing the strength of the system.

It is also from their stimulating power, and perhaps from exciting pain, that blisters are of advantage in apoplexy and paralysis.

Rubefacients operate precisely in the same manner as blisters. They excite pain and inflammation, but only in an inferior degree ; the skin is merely inflamed, and no vesicle raised so that any fluid shall be discharged. By these effects they more peculiarly obviate local inflammation. They are used, therefore, for the same purposes.

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## EPISPASTICS AND RUBEFACIENTS.

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| Meloe vesicatorius. | Elemi. |
| Sinapis alba. | Ammonia. |
| Allium sativum. | Antimonium. |
| Euphorbium. | E her. |
| Pix burgundica. | [Acidum nitricum.—b.] |

Cantharis vesicatoria. Meloe Vesicatorius.

The natural history of Cantharides has been given under the class of Diuretics, to which it belongs. It is a more important article of

the Materia Medica as an epispastic, and is the substance, indeed, which is now almost exclusively employed to raise a blister, as it acts with certainty, and is not liable to induce that deep-seated ulceration which sometimes follows the application of other acrid substances that have been used for the same purpose. The cantharides in powder is mixed with lard and wax, so as to form a plaster of a proper consistence, which is applied to the part generally for 16 or 12 hours : at the end of that time the cuticle is raised, forming a vesicle ; this is then cut, to allow the serous fluid to be discharged, and the inflamed part is dressed with any mild ointment. The principal circumstance which requires caution in the application of the cantharides plaster, is that determination of action to the neck of the bladder which gives rise to strangury. This is more peculiarly liable to occur where the system is uncommonly irritable, where the blister is large, or where it is applied to a newly abraded surface, as to the head recently shaved ; and as it is a very painful affection, not easily removed, care ought to be taken to guard against it. Camphor has been sometimes added to the blistering plaster, with the view of obviating this ; but it is doubtful if it has any such effect. The plentiful use of diluents, while the blister is applied, prevents it more certainly ; and it is always proper when a blister is applied, especially if large, or in inflammatory diseases, to order the patient to drink freely of any mild diluent liquor. Where the strangury does occur from the application of a blister, it is best relieved by an enema of tepid water, with a little expressed oil, and 40 drops of tincture of opium, and by the use of the warm bath, or warm fomentations.

In some diseases, as in apoplexy, it is of importance to be certain of the operation of an epispastic, and to have its effect produced in a short time. To attain these, a compound plaster is ordered by the Edinburgh College, Emplast. Cantharid. Vesicat. Comp., in which the stimulating power of the cantharides is increased by the addition of other acrid substances, burgundy pitch, turpentine, verdigris, mustard and pepper. In the application of this still more caution is necessary to guard again at the occurrence of strangury.

After a blister has been raised, it is often of advantage to convert the serous discharge into one of a purulent nature, by exciting suppuration, or to form what is termed an Issue ; this can easily be effected by the application of any acrid stimulating ointment ; one composed of wax and oil, with a small proportion of cantharides, is commonly used for the purpose, as by the irritation it excites it keeps up the inflammation, and at length produces suppuration. Any foreign body retained on the inflamed part answers the same purpose. What are named Orange Pease, the small unripe fruit of the orange, polished, are usually employed, as by their odour they cover the fetor of the discharge. One of these is retained on the blistered part by a slip of adhesive plaster, and by the irritation it occasions keeps up a constant discharge. A seton or cord, introduced by a needle, answers the same purpose. When a puriform discharge is thus established in a part, considerable effects arise from the morbid action thus produced, and the evacuation it occasions. It is a practice

often employed with advantage in asthma, paralysis, and a number of chronic affections.*

Sinapis nigra. Common Mustard.—The flour of mustard-seed, mixed with an equal part of wheat flour or crumbs of bread, and made into a paste with vinegar, forms what is named a Sinapism, an application which acts as a powerful rubefacient. It is applied to the soles of the feet in typhoid fevers, where there is extreme debility, or determination to the head. It is used in the same manner in comatose affections; the application of it in either case being continued for an hour or two. It soon excites a sense of pain, and if applied long, produces inflammation.

*Offic. Prep.*—Catap. sinapeos.

Allium. Garlic.—The bruised root of this plant applied to the soles of the feet produces effects similar to those of the sinapism, and is used for the same purpose. It is less powerful, and its odour s ungrateful.

Euphorbium. Euphorbia Officinarum.

This resinous substance, already considered as an errhine, is a powerful vesicatory. It enters into the epispastic compositions of the farrier, and might be employed, mixed with other epispastics, when it is of importance to obtain the effects of a blister to their full

* "The United States, rich in the articles of the Materia Medica, furnish us with several species of insects, which may be employed as valuable substitutes for the cantharides of the shops. The species commonly called "Potatoe Fly," which is now much employed (and which I have often employed) as an epispastic, is the Lytta vittata of Fabricius: the Cantharis vittata of Olivier. This, during certain seasons, is so extremely common in many parts of the Union, that it might be collected and sold at a much cheaper rate than the foreign cantharides of the shops, to which it is by no means inferior in strength. On the contrary, from frequent employment of the two articles, I cannot hesitate to prefer the American to the foreign fly. Long-keeping, provided it be carefully kept, does not materially impair the blistering property of the Lytta vittata. At the end of three or four years after being collected, I have found it equal in power to the best shop cantharides. This insect, though commonly called the Potatoe Fly, is frequently met with upon other vegetables of very different natural families, such as garden peas and beans, species of Amaranthus, the Acetæa racemosa (formerly mentioned), and others.——Besides this, there are in the United States several other species of the genus Lytta, such as Lytta atrata, Lytta marginata, &c.—1. Lytta atrata (of which I have observed two varieties, differing both in size and in the shades of colour) is an extremely common insect in many parts of North America. It is most commonly found, in the autumn, upon different species of syngenesious plants, such as Aster, Solidago, &c. Though inferior in power to the Lytta vittata, it is well worthy of the attention of physicians, and may always, I think, be collected in quantity nearly sufficient to answer the demand of the practitioner.—2. Lytta marginata of Fabricius (the Cantharis marginata of Olivier) is much less common: but it is more powerful than either of the preceding species.—3. Lytta cinerea is also very powerful, but not common; at least within the field of my explorations. The blistering property of these two insects is so very great, that the discovery of them, in large quantities, would be a matter of great importance to the interests of medicine. Though they inhabit (one of the species, in particular) plants of a very acrid nature, it does not appear, that from this source they derive *much*, if any, of their peculiar power: for I find that these insects exert equally energetic effects upon the human skin, when they have been confined entirely to a diet of vegetables of a very mild nature, such as the legumina," &c. (Barton's Collections for an Essay towards a Materia Medica of the United States, p. 22.)—B.

extent speedily and with certainty. As a rubefacient it has the advantage over cantharides, that, from its fusibility, it can be diffused uniformly through the resinous matter which forms the composition of plasters, while cantharides can only be mixed in powder. The action of a rubefacient plaster prepared with it is therefore more equal. Twelve parts of burgundy pitch, or of litharge plaster with resin, with one of euphorbium, forms an excellent rubefacient of this kind.

Pix Burgundica. Burgundy Pitch.

This substance is obtained, as was before mentioned, by exudation from incisions made in the trunk of the spruce-fir. It is boiled with water; is strained, and when cold forms a concrete resinous matter, retaining a little essential oil. As a rubefacient, it is spread upon leather and applied to the skin: it excites a slight degree of inflammation, and an exudation of serous fluid, without separating the cuticle, so as to produce a blister. Hence it is less painful in its operation, and the application of it can be continued for a considerable time. It is used with advantage in catarrh, pertussis and dyspnœa.

*Offic. Prep.*—Emp. pic. burg. Emp. pic. comp.

Elemi. Amyris Elemifera. *Octand. Monogyn. Terebinthaceæ,* Juss. *Carolina.*

This resinous substance is obtained by exudation from incisions which are made in the bark of the tree. It is in large masses of a greenish colour, has an odour slightly fragrant, and a warm bitterish taste. It is used to promote the purulent discharge from an issue, and as a stimulating application to foul ulcers, under the form of an ointment, which is officinal in the London and Dublin Pharmacopœias.

*Offic. Prep.*—Unguent. elemi.

Antimony.—The tartrate of antimony and potash was highly recommended by Dr. Jenner, as a counter-irritant, in chronic internal inflammation, deep-seated pains, and likewise in mania. In these affections it has been tried with considerable advantage by different practitioners, and is certainly a valuable remedy in cases of long standing. Lately it has been employed by Mr. Creighton with no small degree of benefit in epilepsy.

*Offic. Prep.*—Ung. tartari emetici.

Ammonia. Ammonia.

The solution of ammonia in water of the usual strength, (Aq. Ammoniæ,) applied to the skin, acts as a rubefacient. The common form under which it has been employed is combined with expressed oil, with which it forms a thick saponaceous compound, (Oleum Ammoniatum,) formerly known by the name of Volatile Liniment. A piece of flannel moistened with this, and applied to the skin, soon excites superficial inflammation. It is often employed, instead of a blister to the throat, in angina tonsillaris, being less painful, yet fre-

quently effectual. It is also applied by friction to relieve the pain of rheumatism.

Ether is sometimes used as a rubefacient, (p. 71.)

[Acidum Nitricum. Nitric acid.

From the certainty and rapidity with which it operates, nitric acid may be esteemed one of our most efficient means of exciting vesication. It was first introduced into practice a few years ago in the East Indies, where it was very successfully used in the treatment of the spasmodic cholera which prevailed epidemically in that quarter of the globe. Since then its use has been extended to other diseases in which it is found necessary to produce prompt and powerful counter-irritation. In applying it, the acid may be used either pure or diluted with one third water. With this the surface is to be rubbed, and as soon as pain is produced, the acid is to be neutralized by washing the part with a solution of salt of tartar. The cuticle is now easily detached, and the cutis left raw. If it is found desirable to continue the irritation, a common blister may after this be laid upon the part.—B.]

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## THIRD DIVISION—OF CHEMICAL REMEDIES.

Under this division are comprised those few classes of medicines, the operation of which either depends on the chemical changes they produce, or is materially modified by these changes. I have placed under it the classes of Escharotics, Antacids, Lithontriptics, and Refrigerants.

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# CHAP. XV.

### OF ESCHAROTICS.

Escharotics are substances which erode or dissolve the animal solids. This they do, either by combining with the animal matter, and forming a soft pulp, or a species of eschar, or by resulting affinity, causing the elements of the soft solids to enter into new combinations, whence their cohesion is subverted, and their composition is changed. In both cases the life of the part is destroyed. They are employed principally to remove excrescences, to establish an ulcer, or to change the surface of an ulcerated part, converting it into a simple sore ; and the principal distinction among them is that founded on the energy of their action,—some eroding merely the cuticle or external surface to which they may be applied, as nitrate of silver, or sulphate of copper ; others, as potash, producing

the decomposition of the animal matter to a much greater depth. The action of some of them, too, that of arsenic for example, appears to be so far specific, that effects are obtained from their operation not easily obtained from the others.

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## ESCHAROTICS.

| | |
|---|---|
| ACID M NITRICUM. | ACETAS CUPRI. |
| ACIDUM ACETICUM FORTE. | MURIAS HYDRARGYRI. |
| ALUMEN. | SUB-NITRAS HYDRARGYRI. |
| POTASSA. | OXIDUM ARSENICI ALBUM. |
| NITRAS AR ENTI. | JUNIPERUS SABINA. |
| MURIAS ANTIMONII. | DELPHINIUM STAPHISAGRIA. |
| SULPHAS CUPRI. | ARTEMISIA CHINENSIS. |

ACIDUM NITRICUM. Nitric Acid.

THE Mineral Acids act rapidly as escharotics, especially the sulphuric and nitric acids. The nitric acid has been highly recommended by Mr. Welbank, as an application to sloughing phagedenic ulcers. In order to employ it without endangering the neighbouring parts, the surface of the ulcer is properly cleaned and dried, and then a thick coating of lard is applied around it. A pledget is then moistened with the undiluted acid, and carefully applied to every part of the phagedenic surface: a slough soon forms, and the ulcer speedily assumes a healthy character.

ACIDUM ACETICUM FORTE. Strong Acetic Acid.—This acid can be prepared of such strength as to be an active escharotic, and for some purposes possesses peculiar advantages. The Colleges of Edinburgh and Dublin give processes for its preparation; but the London College merely insert, among the articles of the Materia Medica, the pyroligneous acid, which is now manufactured on a large scale, and is acetic acid in a very concentrated state. The pyroligneous acid is obtained by first subjecting wood to heat in cylinders of iron, when, with other products, a quantity of empyreumatic acid is formed; this purified forms Wood Vinegar, which, though, from wanting the pleasant flavour of vinegar made from wine, is little esteemed as a condiment, is of more use in chemistry and pharmacy than common vinegar, as being purer. The acid of wood vinegar is combined with lime, and the dried acetate of lime treated with sulphuric acid, which attracts the lime and disengages the acetic acid; the sulphate of lime formed absorbs most of the water present, and acetic acid, combined with only one equivalent of water, distils over.* It is solid at the temperature of 50°, crystallized, white, with a pun-

* The above process, which is believed to be the one practised by the manufacturers of pyrolignic acid, was first suggested by my Father, in an early edition of this work.—*Ed.*

gent odour, a very sour taste, and acrid, so as to inflame the skin. It is much used to remove warts, especially such as are of a venereal nature, to destroy corns, and sometimes as a rubefacient. It is likewise, from its pungent odour, a useful stimulant to the nostrils in faintness, and has been supposed to have a power of opposing contagion.

SUPER-SULPHAS ALUMINÆ ET POTASSÆ. Alumen. Alum.

ALUM, from its excess of acid, has an escharotic power; and under the form of dried alum, in which its water of crystallization is expelled, is used in fine powder, to check the growth of fungous excrescences from ulcers. This powder, rubbed with a little sugar, is, from the same property, applied to remove opaque specks from the cornea.

POTASSA.—Pure potash, in its solid state, forms a powerful escharotic, which has long been in use under the name of Causticum Commune Acerrimum. When its solution, before being evaporated entirely to dryness, is mixed with a portion of lime, its operation is rendered rather weaker: this preparation is named Causticum Commune Mitius. Either of them is made into a paste with soap, and is applied to the part, being covered by a slip of adhesive plaster. This application is frequently employed to establish an ulcer, and sometimes, in preference to incision, to open a tumour; its action is attended with a considerable degree of pain, and a sense of burning heat; after it is removed, a cataplasm is applied, by which this is relieved, and suppuration is established. Mr. Simmons has recommended potash in preference to other escharotics, to prevent the effects from the bite of a rabid animal: it is applied freely to the bitten part; and the preventive operation of excision, he has supposed, may be rendered more certain by touching the surface with potash. Mr. Brande suggests nitric acid for the same purpose.

NITRAS ARGENTI. Nitrate of Silver. Causticum Lunare. Lunar Caustic.

NITRATE of silver is the caustic which is in common use for checking the growth of fungous excrescences, or changing the diseased surface of an ulcer, a little of it being dissolved in as small a portion of water as is sufficient, and being applied by a pencil to the part. The nitric acid destroys the animal texture; the eschar becomes black from the blackening of liberated oxide of silver. This escharotic has been applied in France to prevent the pitting from small-pox; the pustules being touched with it, and when the eschar falls off the part remains smooth. Dr. Duncan is of opinion that the method can be applied successfully only to single pustules; but that, employed to any great extent, such as using the solution freely in confluent small-pox, must be hurtful.

MURIAS ANTIMONII. Muriate of Antimony has been used as an escharotic; but being liquid, it is not easily confined to the part on which it is designed to act, and it has no particular advantage to recommend it.

Sulphas cupri. Sulphate of copper. Blue Vitriol.—This salt is a mild escharotic, and from this mildness of its operation is adapted to particular cases. Its solution in water is sometimes employed to change the diseased surface of sores, especially in venereal sores ; and either in solution, or in powder mixed with any mild vegetable powder, it is applied to remove specks on the cornea.

Sub-acetas cupri. Sub-acetate of Copper. Verdigris.—This preparation, which is properly Acetate of Copper, is in frequent use as an escharotic, principally to change the surface of foul ulcers, being applied under the form of ointment mixed with lard. In the same form it is applied as a stimulant in some kinds of ophthalmia.

*Offic. Prep.*—Cupri subacet. prep. Ung. subac. cup. Oxy. cup. subac.

Murias hydrargyri corrosivus. Corrosive Sublimate.—This preparation of mercury is occasionally employed as an escharotic. Its solution in water, in the proportion of one grain to an ounce, is in particular applied to venereal ulcers ; and still more dilute, it is sometimes used as a lotion to herpetic eruptions.

Sub-nitras hydrargyri. Sub-nitrate of Mercury.—This, the red precipitate of mercury, as it has been named, has long been in common use as an escharotic, and as a stimulant application to foul and languid ulcers. Reduced to fine powder it is sprinkled on the part, or it is applied mixed with lard in the form of ointment.

*Offic. Prep.*—Ung. sub-nitr. hydr.

Oxidum arsenici album. White Oxide of Arsenic.—White oxide of arsenic has been frequently employed as an external application to cancer, and though it has been regarded as in some measure specific, its immediate action is that of an escharotic. It was first introduced as an empirical remedy, (Plunket's Ointment,) and was applied, mixed with vegetable matter ; a drachm of white arsenic, five scruples of sulphur, an ounce of the leaves of Meadow Crowfoot, and an ounce of Dogs-fennel, being rubbed together, and a little of the powder being made into a paste with the yolk of an egg : this, in a few hours, formed an eschar, by which the diseased surface was changed ; and by exciting suppuration by the application of cataplasms, this was thrown off. It has since been used under the form of ointment or solution. The latter has been supposed the least painful form, though perhaps it is not the most effectual. Ten grains are dissolved in one ounce of water, and this solution is applied by a pencil to the sore. It not unfrequently amends the discharge, causes the sore to contract in size, and cases have been related of its having effected a cure. Violent lancinating pain is sometimes produced by its application ; and in some cases, from its continuance, the general system appears to be affected, and symptoms occur indicating affection of the stomach and lungs, which cannot be relieved but by suspending the application. When these appear the use of the arsenic ought to be stopped : and the effects already stated under the

general history of arsenic, as produced by its application to a wound, suggest the propriety of employing it with much caution even externally, especially when it is applied to an excoriated surface. Cases are on record, in which, from the too free application of it in this manner, violent constitutional symptoms, with even a fatal termination, have been induced. Dr. Duncan remarks, that these are especially liable to happen when the arsenic is applied to a bleeding surface. Still, notwithstanding these disadvantages, the benefit derived from the application of arsenic in schirrus and cancer has often been so striking, as to lead to its occasional employment, especially with the view of reducing the size of a cancerous tumour or sore, or in those cases where either the patient will not submit to the operation, or where it cannot be properly performed. The original mode of applying it by cataplasm is probably the most effectual, as changing the whole diseased surface more perfectly.

JUNIPERUS SABINA. Savine.—The leaves of savine possess an acrid power, whence they are employed as escharotic. The powder sprinkled on warts or excrescences removes them, by what kind of operation is not very obvious. When made into an ointment with lard, (Ung. sab. Cer. sab.) it is used as an application to old ulcers, and to some obstinate cutaneous affections.

DELPHINIUM STAPHISAGRIA. Stavesacre. *Polyandria, Trigyn. Ranunculaceæ*, Juss. *Semina.*

STAVESACRE is a biennial plant, cultivated chiefly in Italy. The seeds are large and black, and have an acrid bitter taste. They contain an alkaloid, which has been named Delphinia ; it is acrid and bitter, and forms salts with acids, which are not crystallizable.

Stavesacre was at one time used both as an emetic and cathartic ; but its operation is so violent that it is now never given internally. It is employed as an application to cutaneous eruptions, and to destroy vermin on the skin.

ARTEMISIA CHINENSIS. *Syngen. superfl. Compositæ Corymbiferæ*, Juss. *Folia.* Moxa. *China et India.*

FROM the leaves of this plant a soft down is obtained, to which the name of Moxa is given in the East. It has there been long used to produce eschars, by being burnt on the skin near the diseased part. The moxa, which is merely a finer kind of tinder, is made into a small cone, placed on the spot, and set fire to at the apex. It burns down, and at its base produces a dark-coloured spot, from which an eschar in time separates. The ulcer may be healed up, or kept open as circumstances direct. The pain from the burning is not so great as might be supposed. This practice is often followed in France, in cases of deep-seated inflammations, such as white swelling, in sciatica, paralysis and neuralgia ; but the benefit from it is in general temporary. In England caustics are preferred to the application of fire, as a milder method, and one less formidable to the patient.

# CHAP. XVI.

## OF ANTACIDS.

**These** are remedies which obviate acidity in the stomach, by combining with the acid and neutralizing it. The substances most powerful in exerting this kind of action, and which can be employed, are the alkalis, and among the earths, magnesia and lime. They are all used both in their pure state and in that of carbonate, the carbonic acid being easily disengaged by the acid in the stomach, and the base therefore exerting its neutralizing power. They can be regarded only as palliatives, the production of the acid being to be prevented by the administration of remedies capable of restoring the tone of the stomach. They are employed in dyspepsia, and in diarrhœa arising from acidity. The principal distinction among them is, that some, such as magnesia, form, with the acid in the stomach, a salt having a purgative effect ; others, as lime, a salt apparently inert. They differ also in the degree of neutralizing power ; a given weight of ammonia, for example, neutralizes a larger portion of an acid than any other base does ; magnesia stands next to it in this respect, then lime, while soda and potash are inferior in power. Magnesia is, upon the whole, perhaps preferable to any other antacid : it is little inferior to ammonia in power ; it is perfectly mild, and, from its insolubility, it remains in the stomach, and will continue, therefore, to act while any portion of it remains uncombined.

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## ANTACIDS.

Potassa.
Soda.
Ammonia.
Calx.
Magnesia.

Potassa. Potash.—The chemical characters of this alkali have been already stated, (p. 20), and its use as an escharotic, (p. 256). The solution of it (Aq. Potassæ) is sometimes employed to relieve the symptoms from acidity, where the generation of acid is constant and abundant, being given in a dose of 15 drops diluted in water. Its acrimony renders it, however, an unpleasant remedy. The crystallized bi-carbonate, being more mild, has been introduced as a substitute ; but the best form under which potash can be prescribed as an antacid is that of the super-carbonated solution (Aq. Super-carbonatis Potassæ). It contains an excess of carbonic acid, by which the alkaline taste is concealed, and an agreeable pungency communicated. The liquor is taken as an antacid, in the dose of

half a pound occasionally ; and proves useful in relieving the symptoms connected with acidity in the stomach, not only by the chemical agency of the alkali, but also by the grateful stimulus of the carbonic acid.

Soda.—This alkali is used as an antacid and lithontriptic, in the same forms of combination as potash ; under the form of super-carbonated soda water it is much employed as an antacid, and is preferred to the analogous preparation of potash, as being supposed to be more mild.

Ammonia. Ammonia.—The solution of ammonia in water (Aq. Ammoniæ) is sometimes used as an antacid, and it has been recommended by Dr. Sims as superior to the other alkalis in relieving cardialgia, and other symptoms from acidity : so much so, that he has been led to suppose that these symptoms frequently arise, not from the liquid contents of the stomach being acid, but from an elastic fluid, having acidity, on which the ammonia, from its volatility, more readily acts. From 20 to 30 drops of the solution are given in a cupful of water.

The solution of the carbonate of ammonia is also used, and of the bi-carbonate, which is milder to the taste, and the aromatic ammoniated alcohol forms a still more grateful antacid and stimulant.

Calx.—Lime, under the form of lime water, (Aqua Calcis,) is used as an antacid, in a dose of five or six ounces. It operates not only chemically, neutralizing the acid, but by its astringent and tonic power contributes to restore the tone of the stomach. It is also employed under the form of carbonate of lime, of which the two following varieties are in use.

Carbonas calcis mollior. Creta Alba. Chalk.—This is a carbonate of lime found abundantly in nature, nearly pure, or containing only minute quantities of other earths. It is soft and earthy, of a white colour. From the grosser impurities with which it is mixed, it is freed by levigation and washing, and is then named Prepared Chalk, (Creta Præparata). This is an antacid in very common use. As it forms with the acid in the stomach, (which, according to Tiedemann and Gmelin, is a mixture of acetic and muriatic acids,) a compound which has no purgative quality, it is the antacid commonly employed to check diarrhœa from acidity. It is given in a dose of one or two drachms, with the addition of a small quantity of an aromatic. The chalk-mixture of the Edinburgh Pharmacopœia affords a very good form for administering it.

*Offic. Prep.*—Pulv. carb. calc. comp. Mist. carb. calc. Pulv. cret. cum opio. Troch. carb. calc.

Carbonas calcis durior. Cancrorum Lapilli et Chelæ. Crabs' Stones, Crabs' Claws. Cancer Astacus. Cancer Pagurus. Insecta. Aptera.

In the stomach of the river craw-fish, (cancer astacus,) are found

concretions, consisting principally of carbonate of lime, with a little phosphate of lime and animal gelatin. They are prepared by levigation, and washing with water, and are named Lapilli Cancrorum præparati, formerly Oculi Cancrorum præparati. The tips of the claws of the common sea-crab (cancer pagurus), are similar in composition, and are prepared in the same manner. They are named Chelæ Cancrorum præparatæ. Both are medicinally employed as carbonates of lime, and being prepared with more care, are in general smoother, and more easily diffused in water, than the common prepared chalk, though there is reason to believe, that, as met with in the shops, they are merely chalk with a little gelatin. Their dose is the same.

Magnesia.—Magnesia is usually obtained in the state of carbonate, by decomposing its sulphate or muriate by an alkaline carbonate; and from this, again, the magnesia is obtained in a pure state, by expelling the carbonic acid by the application of heat. In either state it is used as an antacid: the carbonate has the inconvenience, where large quantities of it require to be taken, of occasioning flatulence, from the disengagement of its carbonic acid; and this leads to the preference of the pure magnesia, of which also a smaller quantity is required. It is given in a dose of a scruple or half a drachm. The salts which magnesia forms with the acid in the stomach, muriate and acetate of magnesia, prove slightly purgative; and this is a reason for distinction in practice between this earth and the carbonate of lime; the one being used where diarrhœa accompanies acidity, the other where a laxative effect is wished to be obtained. To obviate the flatulence which it is liable to occasion, or which of itself attends the dyspeptic affections in which it is used, it is advantageously combined with a small quantity of aromatic, as ginger or cinnamon. The preference due to magnesia as an antacid has been stated under the general observations on this class; and it accordingly appears from the experiments, and the cases related by Mr. Brande, that it is much superior to the alkalis in correcting acidity in the stomach. There is a risk, in the frequent use of magnesia, of its becoming aggregated with the mucus of the bowels into masses, which have sometimes occasioned obstinate constipation and enteritis. Hence its continued use should be varied by the exhibition of an aperient.

# CHAP. XVII.

## OF LITHONTRIPTICS.

Lithontriptics are medicines supposed to have the power of dissolving urinary calculi : their operation, it is obvious, must be purely chemical. The fixed alkalis are the principal substances of this class. It was formerly believed, that by the internal use of lithontriptics, continued for a longer or shorter time, calculi in the bladder might be dissolved, and the painful symptoms which they occasion relieved by the removal of the cause. But as in no unequivocal instance can it be said to have been proved that such solution of a calculus has been effected, and as the difficulties in the case are so great as to render the possibility of such solution very doubtful, the medicines of this class are not at the present day given with any other view than to palliate the symptoms, and delay the necessity of a surgical operation.

The idea that lithontriptics might exert an effectual solvent power arose from these facts ; that most calculi consist of uric acid, a substance which alkalis can completely dissolve ; that by a continued exhibition of alkalis the urine itself is rendered alkaline ; and this may even be pushed so far, that the urine out of the body will dissolve a calculus. If this state of the urine could be kept up for a length of time, there might be hopes of attaining the desired end in the solution of the calculus ; but the general health is rapidly injured, and the irritation and suffering become so great, that it is necessary to abandon this line of practice.

But even if it could be persevered in, there are other difficulties to interfere with its success. The urine is a fluid of very complicated constitution, and among the substances which it holds dissolved are several of sparing solubility ; and these, if the state of the urine be rendered sensibly alkaline, are precipitated, thus increasing the concretion which we are attempting to dissolve.

Lastly, though the greater number of calculi are of uric acid, there are many of an altogether different nature, composed of phosphate of lime, oxalate of lime, and other substances, on which alkalis produce no effect. In these cases it is hopeless to attempt a solution, and palliation of the severer symptoms is all that the use of medicines can accomplish.

The following are the principal species of urinary calculi :

1. The Uric Acid Calculus, which I have said is the most frequent, is generally of a brown or yellowish colour, of a compact or radiated structure, smooth on the surface, soluble in pure alkaline solutions, but insoluble in their carbonates ; nitric acid dissolves it, producing a solution of a deep red colour, which is one of the characteristic tests of uric acid. Sometimes the uric acid is combined with ammonia, and then the calculus is of a clay colour.

2. The Phosphate of lime or Bone-earth Calculus has an earthy appearance, and feels rough and dry to the touch ; it is generally of

a pale brown colour externally, but has a white appearance internally. It is insoluble in the alkalis, but soluble in diluted nitric or muriatic acids, and almost always contains a small proportion of uric acid mixed with it. By the administration of dilute acids the tendency of the urine to deposite phosphate of lime may be checked, the acid passing into the urine, and assisting to keep this substance dissolved; but it is impossible to render that fluid so acid as to exert a solvent action on a phosphatic concretion already formed.

3. The Fusible Calculus, which consists of phosphate of lime, and phosphate of ammonia and magnesia; it is so named because it readily melts before the blowpipe. Like the others, it consists usually of successive concentric layers; it is soluble in dilute acids, but not in alkalis. It is smooth, white and friable, and when sawn gives a very light powder of a brilliant whiteness. It has been attempted also to reduce this concretion by exhibition of acids, but in no case with any certain success. Next to the calculus of uric acid, the fusible calculus is the most common species; indeed, as Mr. Brande remarks, the urine has always a tendency out of the body to deposite the phosphate of ammonia and magnesia; and in cases where extraneous bodies have found their way into the bladder, they have always been found coated with this substance. Dr. Prout also states, that whatever state the urine may be in when any calculus is at first formed, the phosphatic diathesis is always assumed sooner or later, and never ceases till the calculus be removed by an operation.

4. The Mulberry Calculus, so named from its dark purple colour and rough tuberculated surface, consists of oxalate of lime. It often forms the nucleus of other varieties of calculi; it is harder and heavier than other calculi, and is insoluble alike in alkalis and weak acids; alkaline carbonates, however, dissolve it. Its colour is attributed to effused blood. According to Mr. Brande, persons who have voided this kind of calculus are less liable to a return of the complaint than those who have discharged uric acid calculi, probably from the former being more an accidental formation than a product of a settled habit of secretion. It is a general opinion, that the mulberry calculus is, from its hardness and weight, the most painful and dangerous species; but Dr. Prout informs us, that it causes comparatively little pain, and that the phosphatic calculi, which are the lightest and smoothest, occasion the severest suffering, a proof that the suffering does not arise so much from the mechanical irritation of the bladder, as from the general morbid state induced. It appears also, that while the proportion of deaths after the extraction of calculi of uric acid, or the earthy phosphates, is about 1 in 6 or 7, in cases of mulberry calculi it is not 1 in 20.

5. The Cystic Oxide Calculus is soluble both in acids and alkalis, forming compounds with them, which may be easily crystallized. This kind of calculus is seldom met with; and the Xanthic Oxide, Fibrinous and Siliceous Calculi are of still less frequent occurrence.

From these diversities in chemical constitution among the urinary concretions it is obvious that we cannot expect uniform advantage from the use of any active solvent as a lithontriptic, since what dis-

solves one calculus will have no effect upon another, a difficulty rendered still greater when, as sometimes happens, the same calculus consists of crusts of several of these substances.

A particular source of difficulty has farther been pointed out by Mr. Brande, attending the attempt to exhibit lithontriptics as solvents. The phosphates of lime and magnesia, which exist in the urine, are retained in solution principally by its excess of acid: if, therefore, with the view of dissolving a uric acid calculus, or preventing its increase, alkalis be given so as to neutralize this acid, the deposition of the phosphates may be favoured, and a layer of them may even form on the existing calculus. And there is reason to believe, that the softness and sponginess which have been observed not unfrequently on the surface of calculi, in patients who have continued for a long period the use of alkalis, and which have been regarded as proofs of partial solution, have arisen from a deposition of this kind. If, on the other hand, from the state of the urine, or from the information afforded by a small calculus being discharged, there were reason to believe that a calculus in the bladder consisted chiefly of phosphate of ammonia and magnesia, if we attempted the solution of this by the administration of weak acids, we run the hazard of causing the deposition of uric acid. It is accordingly found that these effects take place. In different cases, it has been remarked, that when alkalis have been given to correct the deposition of uric acid, or the *red* sediment or gravel from the urine, they have, when continued too long after having produced this effect, caused the deposition of the *white* sediment or gravel,—the phosphate of ammonia and magnesia; and, on the other hand, Mr. Brande has remarked, that when acids were given with the view of removing the deposition of the phosphates, they have, after some time, caused a separation of uric acid. These circumstances render it necessary to employ these remedies with caution, even as palliatives.

There is another mode in which it has been supposed that lithontriptics may exert a solvent power. In all urinary calculi there exists a quantity of animal matter, mucus or albumen, which has been regarded as the cementing ingredient, giving induration to the calculus. On this solvents may act, so as to destroy the cohesion of the aggregate. The experiments of Dr. Egan confirm this, he having found that lime-water is more effectual in destroying the cohesion of a urinary calculus than an alkaline solution,—a result which, on repeating his experiments, I have likewise obtained. Now, this superiority cannot be ascribed to any action of the lime on the saline ingredients of the calculus, but must arise rather from its chemical action on the albumen or animal mucus, of which it is known to be a solvent*; and it may therefore be supposed that lime-water, from this operation, might be used with advantage as a lithontriptic. It would of course require to be given in combination with alkalis, the latter neutralizing the excess of acid in the urine, which would otherwise combine with the lime, and render it inert. But it may

* The same explanation of the action of lime-water on calculi has been lately proposed by MM. Robiquet and Chereau. It was suggested by my Father in an early edition of this work.—*Ed.*

be doubted if this could be managed so as to obtain any important effect.

From these observations we learn not to expect much from the use of lithontriptics; and that as to their effecting a solution of a calculus already formed, the idea must be abandoned. It is as palliatives only that they can be useful.

For this purpose, where the uric acid diathesis prevails, alkalis are given, and often with advantage. The superabundance of uric acid in the urine depends in a great measure on the generation of acidity in the primæ viæ, the acid which is there formed passing off by the kidneys, and causing the precipitation of uric acid; alkalis correct this acidity, prevent the deposition of uric acid, lessen consequently the irritating nature of the urine, and may perhaps prevent the increase of the urinary concretion. It has accordingly been found, that under a course of alkaline remedies the red sediment of uric acid ceases, and the general irritation is diminished. It also appears that these effects are produced, not only by the pure alkalis, but by these when combined with carbonic acid; hence they can be administered in the milder form of the carbonate or supercarbonates.

On the other hand, acids taken in a dilute state lessen the deposition of the earthy phosphates, and are of some benefit, though not so great as the alkalis are, in correcting the symptoms from uric acid. In the administration of both classes of remedies, it is of advantage to attend to the state of the urine so far as regards its chemical constitution, and to suspend or vary the remedies as this may change. And in all cases the continuance of the remedies, and the length to which they are carried, ought to be regulated principally by the relief from pain which the patient receives.

It was proposed by Fourcroy and Vauquelin to apply lithontriptic medicines directly to the calculus, by injecting them into the bladder; and in some trials which they made with dilute alkaline and acid solutions, it seemed that this method promised some success. The solvents, instead of having to pass through the course of the circulation and be secreted by the kidneys, in which progress they are weakened and changed, so as to lose all efficacy, are made to act at once, in the state of purity and concentration that is thought advisable, on the calculus; and the hurtful effects of these remedies on the general health are avoided. Dr. Marcet subsequently made trial of this method with favourable results, and it is rather singular that more attention has not been paid to it.

It has been lately proposed by Prevost and Dumas to attempt the solution or disintegration of calculi in the bladder by the application of galvanism, which may separate the constituent parts; but it is not likely that this agent, applied in such circumstances, can produce any considerable effect.

## LITHONTRIPTICS.

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|---|---|
| Potassa. | Calx. |
| Soda. | Magnesia. |
| Sapo albus. | Acida. |

Potassa. Potash.—The pure alkali has been tried as a lithontriptic, but causes much irritation and suffering; and as there is no likelihood of its dissolving the concretion, the milder form of the super-carbonate, which is equally efficacious as a palliative, is preferred.

The super-carbonated potash water affords the most effectual palliative in cases of urinary calculi; the relief obtained from it appears to arise from its neutralizing the free acid in the urine, and thus rendering it less irritating. From half a pound to a pound is given in the course of the day; and it has the important advantage, that, from its mildness, it can be continued for any length of time without reluctance. There is another advantage belonging to the super-carbonated alkalis compared with the pure alkalis. The latter, if pushed too far, are liable to occasion the separation of the earthy phosphates from the urine; and where the urine is in that state in which these predominate, they must prove injurious. But when super-saturated with carbonic acid, the excess of acid will retain the phosphates dissolved, for this effect is obtained even from water impregnated with carbonic acid alone; and thus all the advantage that can be derived from the alkali will be obtained, without the injurious consequences that arise from the use of it in its pure form.

Soda.—The same remarks apply to Soda considered as a lithontriptic as to potash. The crystallized sub-carbonate of soda affords a very excellent form under which the alkali may be administered, so as to give the advantages of a palliative, and which being less expensive than any other, forms a valuable remedy to the poor labouring under calculus. It forms what has been named the Soda Pill. The crystals are exposed to a very gentle heat, until they lose their water of crystallization, and the dry powder is made into pills with soap. Of these, half a drachm or a drachm is taken in the course of the day.

Soda is likewise employed under the form of the super-carbonated soda-water, the powers of which are similar to those of the super-carbonated potash water.

Sapo albus. Sapo durus.—Soap is a form under which the fixed alkalis have been administered in calculous affections. It is a chemical combination of expressed oil with potash or soda. Potash forms only a soft soap, soda gives one that becomes hard; and to form the purer soap which is fit [illegible] medicinal use, it is combined with the mildest vegetable expressed [illegible], as that of the olive. The soap is white, but sometimes is designedly coloured by the addition to it, while soft, of a solution of sulphate of iron.

The acrimony of the alkali is much diminished by its combination with the oil, and on this account soap has been preferred as a lithontriptic, one or two ounces being taken in the course of the day. From the oil it contains, however, it is nauseous, and in such large doses, generally offensive to the stomach, and the super-saturation with carbonic acid affords a much better method of rendering the alkali mild. Soap is sometimes used in pharmacy to give consistence to powders when they are to be formed into pills.

Calx.—Lime, in the form of Lime-water, has been used in calculus, in the quantity of a quart or more daily; and it would appear with some advantage. It may correct acidity, but it seems to have some action more important than this, for its efficacy seems to be greatest when it is given along with alkalis, as in the celebrated remedy of Mrs. Stephens, (consisting of lime and soap); here the alkalis neutralize acidity, and the lime probably exerts, as has been stated, a solvent action on the mucus which cements together the matter of the concretion.

Magnesia.—The advantage derived from lithontriptics being in a great measure confined to their neutralizing acidity in the stomach, as above explained, magnesia has been employed for this purpose as equally effectual, and as possessed of some peculiar advantage over the alkalis. From its insolubility it will remain longer in the stomach, and from this, it has been supposed, will more certainly neutralize the acid; it has accordingly been affirmed, on the authority of Mr. Home, that it diminishes more effectually the deposition of uric acid from the urine; and some cases have been related by Mr. Brande, in which magnesia had proved effectual, where the alkalis previously given had failed to relieve the too abundant secretion of this acid. It has also been supposed, that even if it be taken in excess, it will not, from its insolubility, be secreted by the kidneys, and hence will be less liable than the alkalis to cause a deposition of the urinary phosphates; and its mildness admits of its continued use. The pure magnesia being more active than the carbonate, and being perfectly mild, it is preferred. The dose in which it has been given is from a scruple to half a drachm twice a day. In some cases in which it was employed, where gout was connected with gravel, the symptoms of the former disease were at the same time alleviated. An elegant form of administering this remedy in calculous cases is the super-carbonated water of magnesia, prepared in a similar manner as the super-carbonated soda water.

Acida.—Acids have sometimes been employed as lithontriptics. Where the state of the urinary secretion is such that there is a separation of phosphate of lime, or phosphate of ammonia and magnesia, they prevent this by their solvent power; but this is comparatively rare. Where there is a too copious secretion of uric acid, they must increase it, and prove prejudicial; and in such cases accordingly they occasion irritation and pain. In employing them, care must be taken to guard against the separation of uric acid by their too free

or long-continued use. The obvious rule is, to give the acid to that extent which shall afford relief from irritation, and which shall lessen or remove the deposition of the earthy phosphates, easily recognised by their white colour, from the urine, and to diminish the dose, or rather intermit the use of them, whenever any deposite of uric acid appears.

Different acids have been employed. Much relief has been obtained from some of the vegetable acids, particularly the citric acid, under the form of lemon juice, taken to the extent of half an ounce daily. The diluted nitric or muriatic acid has been used with advantage in a dose of from 30 to 50 drops twice or thrice a-day. According to Mr. Brande's observations, the vegetable acids, particularly the citric and tartaric, are less liable than the mineral acids to produce the separation of uric acid. Carbonic acid was at one time employed, but had fallen into disuse, probably from the belief of its action being too weak to produce any lithontriptic effect. It has been found, however, that water impregnated with it, taken as a common beverage, diminishes the deposition of earthy phosphates, particularly the phosphate of ammonia and magnesia, rendering the urine transparent, which had before been turbid. Where it does so far succeed, it must be preferable to any of the other acids, both as being less likely to cause any separation of uric acid, and as having the advantage that it can be taken for any length of time without any reluctance, has no injurious effect on the stomach, and admits of being used in that irritable state of the bladder which sometimes precludes the use of the others.

Bitters and astringents, such as Uva Ursi, have been found of service in calculous cases; they evidently are so by restoring the tone of the stomach, and thus preventing the generation of acid; and they cannot therefore be considered strictly as Lithontriptics.

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## CHAP. XVIII.

### OF REFRIGERANTS.

The substances arranged by authors on the Materia Medica under the appellation of Refrigerants, have been defined, Such medicines as diminish the force of the circulation, and reduce the heat of the body, without occasioning any diminution of sensibility or nervous energy. The theory delivered of their operation is unsatisfactory and obscure; nor are even the facts adduced to establish that operation altogether precise. It is acknowledged by Cullen, that, "in many trials made on purpose, it did not appear that the supposed refrigerants diminished that temperature of the body, which is the ordinary temperature of it in health." He concludes, therefore, that

the definition should apply only to the reduction of the temperature when it has been morbidly increased; and even in this case the effect of these medicines is allowed not to be considerable.

It is not necessary to review the opinions that have been advanced on the mode of operation of refrigerants, they are so extravagant and improbable. The explanation given by Dr. Cullen it is scarcely possible to understand. Its basis, he remarks, is a doctrine delivered by Needham, "that there is everywhere in nature an expansive force, and a resisting power; and that, particularly under a certain degree of heat, the expansive power appears in all the parts of organized bodies, in consequence of which they shew a singular vegetating power; while, at the same time, in other bodies there is a power resisting and preventing the action of this vegetating power, and at least of diminishing its force." This power, it is added, is found in those saline substances supposed to be refrigerants; and "as an increase of heat is no other than an increase of the expansive force in the heated parts, it may be understood, how resisting powers may diminish any preternatural expansive force and heat in our bodies."

The discoveries of Modern Chemistry furnish some facts which may perhaps be applied to this subject; and indeed it is only to those discoveries which establish the source of animal temperature, that we are to look for an explanation of the changes to which it is subject.

It is established by experiment, that the consumption of oxygen in the lungs is materially influenced by the nature of the ingesta received into the stomach. When these are composed of substances which contain a small proportion of oxygen, the consumption of oxygen is increased, and this in a short time after the aliment has been received. Thus Mr. Spalding, the celebrated diver, observed, that when he used a diet of animal food, or drunk spiritous liquors, he consumed in a much shorter time the oxygen of the air in his diving-bell; and therefore he had learned from experience to confine himself to a vegetable diet, and water for drink, when following his profession. During digestion, too, it was established by the experiments of Lavoisier and Seguin, that a larger proportion of oxygen than usual is consumed.

The animal temperature is derived from the consumption of oxygen gas by respiration: and an increase in that consumption will occasion a greater evolution of caloric in the system, and consequently an increase of temperature, while a diminution in the consumption of oxygen will have an opposite effect. If, then, when the temperature of the body is morbidly increased, we introduce into the stomach substances containing a large proportion of oxygen, especially in a loose state of combination, we may succeed in reducing the morbid heat. This we accomplish in part by a vegetable diet, but still more effectually by the use of *acids*. The vegetable acids in particular, which by experience are found to be the best refrigerants, are acted on by the digestive powers, and assimilated with the food. And as the oxygen they contain is in a concrete state, little sensible heat can be produced by the combination of that element

with the other principles of the food. The nutritious matter conveyed to the blood, containing thus a larger proportion of oxygen than usual, will be disposed to abstract less of it from the air in the lungs, and consequently less caloric will be evolved. The temperature of the body will be reduced, and this operating as a reduction of stimulus, will lessen the number and force of the contractions of the heart.

It might be supposed that any effect of this kind must be trivial: and it actually is so; for we find in practice that refrigerants produce no sudden or great change. They operate insensibly, and have little other effect than moderating the morbid heat. The whole of their effects, as Cullen remarks, are so slowly produced, as not to be very evident to our senses, nor easily subjected to experiment, being found only in consequence of frequent repetition.

The other refrigerants, the neutral salts, perhaps act in a similar manner; the acid they contain may yield oxygen, but they are less effectual than acids, and their refrigerant power is even problematical, except in so far as they operate on a principle different from that which has been pointed out,—the power they have of producing in the stomach a sensation of cold. If a draught of cold water be swallowed, the sensation of cold it produces in the stomach is equivalent to a partial abstraction of stimulus, which being extended by sympathy to the heart, occasions a transient reduction in the force of the circulation, and by this, or by a similar sympathetic affection, causes a sensation of cold over the body. Nitre is an example perhaps of a refrigerant acting in this manner. It excites a sensation of cold in the stomach even when taken dissolved, and still more in the solid state; and this is followed by a reduction in the number and force of the pulsations. Hence nitre acts more suddenly than the other refrigerants, and is more transient in its operation. It may also operate in some degree more permanently, in the same manner as the vegetable acids; as it is probable, from the florid colour it gives to blood, that it parts with oxygen rapidly.

It is evident that the indication to be fulfilled by the use of refrigerants is the reduction of morbid heat. Hence the propriety of their administration in synocha and other pure inflammatory diseases, and in typhus fever; in both of which the temperature of the body is increased, though from different causes. In inflammatory diseases, the circulation being so much more rapid than usual, a greater quantity of blood is sent through the whole body and through the lungs in a given time; and the usual alterations of the blood taking place, the evolution of caloric, which is the consequence of these alterations, must be increased, and the temperature raised. In such cases, the use of acids, by lessening the disposition of the blood to consume oxygen in the lungs, may be useful in reducing the temperature; and nitre may be of advantage, as it diminishes the force of the contractions of the heart. These means, however, can have only a trivial effect, compared with those evacuations by which the force of the circulation is lessened.

The increased temperature in typhus fever seems to be owing to the absorption of the animal solids, which, containing comparatively

little oxygen, cause the blood to consume more of it in the lungs. The introduction of acids into the system, by affording this element in a concrete state to that matter, will lessen the consumption of it in respiration, and of course moderate the morbidly increased temperature. In either of these forms of disease, therefore, refrigerants may be useful, and accordingly we find them generally used in all the species of febrile affection; though they are still to be regarded as medicines of weak power.

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## REFRIGERANTS.

Citrus medica.
Citrus aurantium.
Tamarindus indica.
Oxalis acetosella.
Rumex acetosa.
Acidum citricum.
Acidum tartaricum.
——— aceticum.
Super-tartras potassæ.
Nitras potassæ.
Sub-boras sodæ.

All acids are supposed to be refrigerants; but the vegetable acids possess this power in a more eminent degree, a superiority which, according to the preceding view, must be founded on their being more easy of assimilation, and of being acted on by the chemical processes of the living system. The native vegetable acids are found chiefly in the fruits of vegetables. The sour juice of these fruits consists of the Citric or Malic Acid, or more frequently of a mixture of both, sometimes with the addition of tartaric acid. The citric acid is that which is most largely employed, as it forms the acid juice of the orange and lemon, the two acid fruits in common medicinal use.

Citrus medica. Limones. Lemon. *Succus fructus.*
Citrus aurantium. Orange. *Succus fructus.*

The juice of the fruit of the lemon consists principally of citric acid, with portions of gum and sugar. As the fruit cannot always be procured, various methods have been employed to preserve the juice. The most effectual is to add to it, when newly expressed, a portion of alcohol, and to put it aside until the mucilaginous matter is deposited, then, by a moderate heat, to evaporate the alcohol, and preserve the juice in bottles carefully closed. Even as prepared in this method, however, it is liable to chemical change.

Lemon juice is preferable to all other refrigerants, being more mild and grateful, and deriving, perhaps, some advantage from being more easily assimilated. It is used for the general purposes of refrigerants,—to cool and quench thirst in febrile affections. A grateful beverage is formed from it, diluted largely with water, and sweetened a little with sugar: or the fruit, sliced down, is added to any mild diluent. A preparation from it, which is used as a refrigerant in fever, is what is named the Saline Mixture, formed by neutralizing

lemon juice by the addition of carbonate of potash, adding to this water, with a little sugar and a small portion of any distilled water. Of this mixture a table-spoonful is taken occasionally; it is grateful, but cannot be considered as possessed of much power, any refrigerant quality which may belong to the acid being probably lost by its neutralization.

Another form under which lemon juice is used to relieve nausea, and check vomiting, is that of the Effervescing Draught. A solution of 20 grains of sub-carbonate of potash and an ounce of lemon juice are mingled together, and while in the act of effervescence the mixture is swallowed. The efficacy of it is probably dependent on the pungency and stimulant operation of the carbonic acid, but it affords a grateful form under which this can be administered.

The juice of the lemon, and indeed the citric acid, as it exists in any vegetable fruit, has been long known as nearly an infallible remedy in scurvy. A theory of its operation in removing this disease has been given, founded on its chemical agency, and particularly on the supposition that it imparts oxygen to the system, which is not without probability. In some forms of urinary calculus it affords relief.

The juice of the Orange has a certain degree of sourness, accompanied, in the variety named the China Orange, when ripe, with sweetness; in that named the Seville Orange, with a slight bitterness; and this sourness appears to depend on citric acid. The former is used as refrigerant in febrile affections, more grateful, but less powerful than the fruit of the lemon. It is also used as a remedy in scurvy.

TAMARINDUS INDICA. Tamarind.—The fruit of the tamarind contains an acid pulp, which is preserved by the addition of unrefined sugar, this forming the Tamarinds of the shops. The acid is principally the citric, (p. 191.) This pulp forms a grateful refrigerant beverage, a little of it being infused in tepid water, which is often taken in febrile affections.

OXALIS ACETOSELLA. Wood Sorrel. *Decand. Pentag. Gruinales,* Linn. *Oxalideæ,* De Cand. *Indigenous.*

THE leaves of this plant have a sensible sourness, and, by expression, afford a juice strongly acid. This is owing to the presence of oxalic acid, combined with potash, the acid being in excess. This salt,—the super-oxalate of potash, extracted from it, and purified by crystallization, forms the Salt of Lemons of the shops. The leaves of sorrel have been used, from their acidity, as a refrigerant, under the form of the whey obtained by boiling them in milk. They have also been employed, with advantage, in their recent state, as a stimulating application to scrofulous ulcers.

The acid prepared from this plant, the oxalic, when taken in large doses, is a virulent poison; and, from the resemblance of the crystals to those of the sulphate of magnesia, accidents of this nature sometimes occur.

The symptoms which succeed oxalic acid, when taken in a suffi-

cient dose to poison, are incessant vomiting of a dark-coloured and occasionally bloody matter, with a severe sensation of burning in the stomach; the pulse becomes almost imperceptible, attended with coldness of the extremities, lividity, convulsions, and death. These are the effects when it is taken in a concentrated state; they arise from its corrosive action; but Dr. Christison remarks, that if it be much diluted, it acts as if it were a narcotic, producing the same symptoms as a large dose of opium. Half an ounce of the acid has occasioned death. The antidotes are powdered chalk or magnesia, either of which combine with the oxalic acid, producing inert compounds; cordials, with opium in small doses, may then be given. It is not difficult to detect oxalic acid where it has been a cause of death, as it is not liable to be changed by animal matter. Muriate of lime affords a good test, the insoluble oxalate of lime being thrown down from it. But a test still better is the nitrate of silver; it affords with oxalic acid a heavy white precipitate, which, dried and heated over the flame of a candle, explodes, and is dissipated in white fumes; this, according to Dr. Christison, is a delicate and unequivocal test of oxalic acid.

The resemblance between Epsom salt and oxalic acid is so great, that the mistake of the one for the other frequently happens. By the mere aspect they can scarcely be distinguished; hence it is recommended always to taste Epsom salt before swallowing any large portion of it; its taste is simply bitter, while the taste of oxalic acid is intensely sour. Or a few crystals may be placed moistened on blue paper, which, if they redden, they must be oxalic acid.

Rumex acetosa. Common Sorrel. *Hexand. Trigyn. Polygoneæ,* Juss. *Folia. Indigenous.*

The leaves of common sorrel have a slightly sour taste; they contain binoxalate of potash and tartaric acid. The expressed juice may be used to form an acidulous drink.

Acidum citricum. Citric Acid.—Lemon juice being liable to ferment and spoil, especially in voyages by sea, where, as an antiscorbutic, it is most needed, it was supposed that the purified citric acid, which does not change by keeping, might be substituted, hence a process for preparing it is inserted into the Pharmacopœias. It appears, however, that the pure acid has not the power of curing scurvy so remarkable in lemon juice, a fact not easily accounted for, unless we suppose that the acid, when combined with other vegetable matter, is more easily received into the system by assimilation. Citric acid is, however, useful in forming effervescing draughts, and a grateful lemonade may be prepared by dissolving thirty or forty grains of the acid in a pint of water, with the addition of sugar, and some pieces of dried lemon peel, to communicate flavour, or a little of the essential oil of lemons. *Lemonade powder* consists of citric acid and sugar, with some drops of this essential oil, and, if kept in phials well closed, preserves the flavour for a long time.

Acidum tartaricum. Tartaric Acid.—This acid, which is pre-

pared from the bitartrate of potash, is employed as a substitute for citric acid, being cheaper, and equally adapted for making effervescing draughts. It is the acid in the common Soda powders; the white paper contains tartaric acid, the blue, bicarbonate of potash; they are dissolved separately, and mixed, when a large quantity of carbonic acid is evolved, and bitartrate of potash formed in the solution; the carbonic acid stimulates the stomach, and the salt formed acts as a gentle purgative. In the Seidlitz powders, according to Dr. Paris, the white paper contains two drachms of the tartrate of potash and soda (Rochelle salt,) with two scruples of carbonate of soda; the blue paper contains 35 grains of tartaric acid; when the powders are dissolved and mixed, carbonic acid gas is evolved, and there remains the tartrate of potash and soda, with a portion of tartrate of soda, salts which are mild to the taste, and act as purgatives.

Acidum aceticum dilutum. Acetum. Dilute Acetic Acid.—Vinegar is a weak acid, formed in the acetous fermentation which succeeds to the vinous, when the fermented liquor is submitted to the due degree of temperature. The temperature most favourable is between 60° and 70°; the presence of a portion of the yeast, formed during the vinous fermentation, promotes the process, and the air must be admitted. The spiritous flavour and pungency, and intoxicating quality of the fermented liquor, are lost, and it becomes sour. The product is in general more acid, as the liquor has been more spiritous. Vinegar from wine, therefore, is strongest, and its odour is more grateful. It is obtained of inferior quality, both with regard to purity and strength, from fermented malt liquors, or from a solution of sugar, in which fermentation is excited by yeast.

In the acetous fermentation the oxygen of the air is absorbed; and according to the experiments of Saussure, an equal bulk of carbonic acid is formed. The theory of the process is still obscure. It is certain that the alcohol is converted into acetic acid, which contains more oxygen, and less carbon; but if all the oxygen absorbed be converted into carbonic acid, it is not apparent how the acid is produced.

Vinegar fully fermented is limpid, of a yellowish colour, has an odour which is agreeable and somewhat pungent, and a sour taste. The acetic acid in it is largely diluted with water, and there are also present portions of gluten, mucilage, and extractive matter, and frequently malic and tartaric acids. The presence of the vegetable gluten renders it liable to that kind of decomposition whence it becomes mouldy on the surface; hence the rationale of the process by which this may be counteracted, and vinegar preserved,—that of boiling it gently for a few minutes,—the gluten being separated by coagulation.

It is freed from its impurities by distillation, the process for which has a place in the Pharmacopœias. Distilled vinegar is colourless, its odour is less grateful than that of common vinegar, but it is purer, and is not liable to spontaneous decomposition; hence it is preferable for the preparation of medicinal vinegars, and other purposes in

pharmacy. Instead of distilled vinegar, however, what is named Wood vinegar is now commonly used in pharmacy. To obtain this, wood is inclosed in iron cylinders or retorts, which are exposed to a red heat. The decomposition of the woody fibre yields, along with a considerable quantity of gaseous matter, an empyreumatic liquid, which is acetic acid combined with a quantity of tar, essential oil, and, it is said, also of ammonia. To purify it from these it is mixed with animal charcoal, prepared by calcining the most compact beef or mutton bones in a crucible, partially closed by a cover having a small aperture to allow the gases to escape. To a wine quart of the cold wood vinegar an ounce and a half of this charcoal, reduced to powder, is added; in three or four days the acetic acid will become quite colourless, and, upon filtering it through paper, it will be found to be quite purified.

Vinegar is sometimes employed as a refrigerant in febrile affections, being added to any common diluent. Externally, it is used as an application to burns, and as a discutient. Its odour is grateful when it is sprinkled on the floor of the chamber of the sick in typhoid fevers; and the virtue has been ascribed to it, of neutralizing noxious or contagious effluvia. In pharmacy, distilled vinegar is employed as the solvent of the active matter of several vegetable substances.

*Offic. Prep.*—Acid. acet. dist. Acid. acet. arom. Acid. acet. camph. Syr. acet.

Super-tartras potassæ. Super-tartrate of Potash. Bi-tartrate of Potash.—From the excess of acid which this salt contains it possesses the virtues of a refrigerant. A solution of it in a large quantity of water, sweetened with sugar, and receiving flavour from the infusion of the rind of lemon, forms a cooling beverage, used in febrile affections, and recommended, especially in hospital practice, by its cheapness. Its only disadvantage is its being liable to prove purgative.

Nitras potassæ. Nitrate of Potash. Nitre.—This salt impresses a sense of coolness in the mouth, and when taken in small doses, frequently repeated, appears to have the effect of reducing the force of the circulation. It is hence sometimes used as a refrigerant in inflammatory diseases, particularly in acute rheumatism, and in hæmoptysis. It is given in a dose of from 5 to 15 grains repeated every four or five hours. When given in large doses it occasions nausea, and pain of the stomach. It is often used as a refrigerant, under the form of gargle, in the different species of cynanche, one drachm being dissolved in six ounces of water; or the nitre troches (troch. nit. pot.) are allowed to dissolve slowly in the mouth.

Sub-boras sodæ. Boras sodæ. Borate of Soda. Borax.

This salt is a biborate of soda, containing two equivalents of boracic acid and one of soda. It is brought from Thibet, where it is found in a native state, being dug from a lake in which it is spontaneously deposited. It is impure, but is purified in Europe by crys-

tallization, and is usually in crystalline masses of no regular figure; its taste is cool; it is soluble in eighteen parts of cold, and six of hot water.

Borax is not used internally in modern practice, nor does it appear to possess any activity. Its solution is in common use as a cooling gargle, to relieve the sense of heat in the mouth which attends salivation; and mixed with an equal quantity of sugar, it is used in the form of powder to remove the aphthous crust from the tongue in children. Mixed with honey, it forms an officinal preparation, (Mel borac.) applied to the same purpose.

## FOURTH DIVISION—OF MECHANICAL REMEDIES.

The last subdivision of the classification includes those classes of remedies, the operation of which is merely mechanical. Under this I have placed Diluents, Demulcents, Emollients and Anthelmintics. They are classes of comparatively little importance.

# CHAP. XIX.

### OF DILUENTS.

Diluents have been defined, Substances which increase the fluidity of the blood, by augmenting the proportion of fluid in it. Watery liquors, it is obvious, will have this operation to a certain extent, and, strictly speaking, water is the only proper diluent. But different mild substances are added to it to give a slight taste and flavour, so as to render it more pleasant when it is to be drunk in large quantities; and frequently to communicate to it a demulcent quality, diluents and demulcents being generally employed to answer the same indications. With the former intention water is infused on scorched bread; or a decoction of bran is used. Gruel, which is a decoction of the grains of the oat (Avena sativa,) freed from their husk, is the most common lubricating diluent. Whey (Serum lactis) affords a form still more grateful, which is less liable to pall the appetite or load the stomach than any other, and which, at the same time, conveys some nutrition.

Diluents are prescribed principally in acute inflammatory diseases, with the view of quenching thirst, diminishing the stimulating quality of the blood, promoting the fluid secretions, and, in particular, rendering the urine more dilute, and therefore less acrid and irritating. They are employed too to favour the operation of sweating, being given tepid; and sometimes to promote the action of diuretics, especially of those which are saline; and there are some

chronic diseases, more particularly affections of the glandular system, in which diluents appear to be advantageous. Some mineral waters, celebrated for their efficacy, are water uncommonly pure; and the advantage derived from these in scrofula, and some other morbid affections, can scarcely be attributed to any other operation than mere dilution.

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## CHAP. XX.

### OF DEMULCENTS.

Demulcents are defined, "Medicines used to obviate and prevent the action of acrid and stimulant matters; and that, not by correcting or changing their acrimony, but by involving it in a mild and viscid matter, which prevents it from acting upon the sensible parts of the body," or by covering the surface to which they may be applied. Their action has been supposed to be exemplified in catarrh, where the irritation at the top of the trachea, occasioning coughing, is removed by mucilaginous substances; or in gonorrhœa, where the sense of heat and pain, from the application of the stimulus of urine to be inflamed surface of the urethra, is prevented by similar means.

When these substances are directly applied to the part, it may be understood how this operation is obtained from them; but where they are received by the medium of the stomach into the circulating system, it has been supposed that they can have no such effect. They must be changed by the process of digestion, and lose that viscidity by which only they operate, so that they cannot afterwards be separated by any secretion in their original form. Hence their utility in gonorrhœa and similar affections has been altogether denied.

It is not clear, however, that such a conclusion is just. It is sufficiently certain, that many substances, which undergo the process of digestion, are afterwards separated in their entire state from the blood, by particular secreting organs. There is no gland which has this power more particularly than the kidneys; substances received into the stomach and digested, afterwards passing off in the urine with all their peculiar properties. Sugar, for example, there is reason to believe, can be separated in this manner; yet there is no substance which can be supposed to be more completely assimilated by digestion, or to be more easily changed in its composition by the chemical operations of the system. If it therefore can be re-produced by secretion, it is equally probable, that mucilaginous or oily substances, which form the principal demulcents, are capable of such a separation. There can be no doubt, however, but that a great share of the relief demulcents afford in irritation, or inflammation of the urinary passages, is owing to the large quantity of water in which

they are diffused, by which the urine is diluted, and rendered less stimulating. Or, demulcents may be considered as substances less stimulating than the fluids usually applied to the parts that are in a state of irritation.

The diseases in which demulcents are used are principally catarrh, diarrhœa, dysentery, calculus, and gonorrhœa. They are evidently not medicines of any great power; they are only calculated to alleviate symptoms, and may be freely used in as large quantities as the stomach will receive them.

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## DEMULCENTS.

Acacia arabica.
Astragalus tragacantha.
Linum usitatissimum.
Althæa officinalis.
Malva sylvestris.
Glycyrrhiza glabra.
Smilax sarsaparilla.
Triticum hybernum.
Hordeum distichon.
Maranta arundinacea.
Saccharum officinarum.
Arctium lappa.
Lichen islandicus.
Cornu cervi.
Ichthyocolla.
Amygdalus communis.
Olea europæa.
Cetaceum.
Cera.

Acacia arabica et Acacia vera. Gummi Arabicum. Gum Arabic. *Polygam. Monœc. Lomentaceæ*, Linn. *Leguminosæ*, Juss. *Africa.*

Gum is a proximate vegetable principle, which is obtained by exudation from a number of plants. The Gum Arabic of commerce is the produce of a genus of plants growing in Africa, which has been named at different times Mimosa and Acacia. Of this there are several species, of which the London College name the Acacia vera, the Edinburgh College the Acacia arabica and A. vera as the sources of this gum. It seems to be derived also from other species. The greater part of the gum arabic of commerce is imported from Barbary, being the produce of Morocco, and principally of the mountains of Atlas. It is an exudation, in the form of a viscid pellucid juice, from the bark of the trunk and branches of the tree, which hardens by exposure to the air and sun. The purest gum of the shops is in small irregular pieces, white or yellowish, semi-pellucid, without taste or smell: there are other varieties coarser, of a yellow or red colour: these are sometimes named Gum Senegal, and appear to be of different origin. All of them have the properties of Gum; are insoluble in alcohol or oils, and soluble in water, forming a viscid solution named Mucilage; gum is also soluble in the vegetable acids,* but is decomposed by the strong mineral acids. Its composition is stated p. 39.

Gum arabic is in common use as a demulcent. In catarrh it is allowed to dissolve slowly in the mouth, as in the Jujube lozenges,

which consist of it. It is also the basis of the mixtures usually employed to allay coughing. Sometimes it is employed in tenesmus, strangury, and ardor urinæ. In Pharmacy, gum arabic is employed for a variety of purposes. It serves to suspend heavy powders in water, to diffuse oils, balsams, and resins in water, and give tenacity to substances made into pills.

*Offic. Prep.*—Emuls. acac. arabic. Mucilago acac. arabic. Troch. gum.

Astragalus tragacantha. Tragacanth. *Diadelph. Decand. Papilionaceæ*, Linn. *Leguminosæ*, Juss.

Tragacanth is a gum obtained by exudation. The plant which was supposed to afford it was described by Linnæus as a species under the name of Astragalus Tragacantha. According to Olivier it is of a different species, which he describes under the name of Astragalus Verus; and this is admitted by the London College. Again, the Dublin College refer it to the Astragalus Creticus, and it is doubtful which of the three is the true species. Tragacanth is the produce of Persia and of Asia Minor: it is in small wrinkled pieces, semi-transparent and brittle, and has neither taste nor smell. It differs from the other pure gums in not being perfectly soluble in cold water; it is softened and diffused, but remains flocculent and turbid. It is greatly superior to all the gums in giving viscidity to water; its power in this respect being to that of gum arabic as 1 to 24. These peculiarities arise from its containing a portion of the principle named Bassorin, (see Salop).

Tragacanth has virtues similar to gum arabic. It is less employed, except in some pharmaceutical processes, in which, from its greater viscidity, it is preferred, as in the making of troches.

*Offic. Prep.*—Mucil. trag. Pulv. trag. comp.

Linum usitatissimum. Flax. *Pentand. Pentag. Gruinales*, Linn. *Linaceæ*, De Cand. *Semina.*

The seeds of this plant yield a strong mucilage by infusion or decoction in water: by expression they afford a quantity of oil. This being inferior in purity to the olive or almond oil is little used in medicine. But the mucilage (Inf. lini) having no unpleasant taste or smell is frequently used as a demulcent in catarrh and gonorrhœa, being rendered more grateful by the addition of a little sugar and lemon juice. The decoction, containing a portion of the oil diffused in the mucilage, is less grateful.

Althæa officinalis. Marsh-mallow. *Monadelph. Polyand. Columniferæ*, Linn. *Malvaceæ*, Juss. *Folia et Radix.*

This indigenous plant grows, as the name implies, in marshy situations. All the parts of it yield a mucilage by infusion or decoction in water; the root does so most abundantly, and, freed from the outer bark, is kept in the shops. It is white, inodorous, and insipid. Its mucilage is similar to that from lintseed, and is used for the same purposes. It is even preferable, as being more pure. A peculiar

principle was supposed to exist in it, which was named Altheine; but it has been shewn to be asparagin.

*Offic. Prep.*—Decoct. alth. Syr. alth.

MALVA SYLVESTRIS. Common Mallow. *Monad. Polyand. Columniferæ*, Linn. *Malvaceæ*, Juss. *Folia.*

THE leaves of this plant afford a mucilage by infusion in water, which is weaker, however, than that from lintseed or althæa, and is therefore little used. The leaves have also been used for the purpose of fomentation, and their decoction affords an emollient enema.

GLYCYRRHIZA GLABRA. Liquorice. *Diadelph. Decand. Papilionaceæ*, Linn. *Leguminosæ*, Juss. *Radix. South of Europe.*

THE root of this plant, which is long, slender, and flexible, covered with a thin epidermis, has a sweet agreeable taste, with no flavour. This sweetness is extracted by water by infusion or decoction; and by evaporation a dark-coloured extract of the same sweet taste is obtained.

The sweetness of liquorice depends upon a peculiar principle, which Robiquet named Glycyrrhizine or Glycion. Berzelius obtained it more pure. It is a yellow substance like amber, soluble in water and alcohol; sweet, but not susceptible of fermentation; it forms compounds with acids and with alkalis, all of which are sweet.

Liquorice-root is employed as a demulcent, and, on account of its sweet taste, is frequently added to infusions of lintseed or althæa. The extract is in common use as a demulcent in catarrh, being allowed to dissolve slowly in the mouth, to allay the irritation which produces coughing; it also relieves the sensation of heartburn from acidity in the stomach.—*Offic. Prep.* Extr. glycyrrh. Decoct. glycyrrh. Troch. glycyrrh. Troch. glycyrrh. cum opio.

SMILAX SARSAPARILLA. Sarsaparilla. *Diœcia, Hexand. Sarmentaceæ*, Linn. *Asparagineæ*, Juss. *Radix.*

THIS root, which is said to be derived not from the S. sarsaparilla, but from the S. syphillitica, is imported from the Spanish West Indies. It is in long slender twigs, which for pharmaceutic preparation are split and cut into small pieces; it is internally white, and covered with a brownish bark; has scarcely any smell, but has a slight bitterness, which water extracts along with a quantity of starch. The existence of two peculiar substances in sarsaparilla has been asserted; the one has been named Parigline, the other Smilacine; and Pfaff found a kind of extractive, which seemed to resemble cinchonia. The existence of these principles is very doubtful, and the root appears to consist principally of woody fibre and starch, with a small portion of bitter resin.

Sarsaparilla produces no obvious effect on the system, and it can scarcely be regarded in any other light than as a demulcent. It has, however, been considered as a specific in the treatment of some venereal affections, particularly those of the bones or periosteum, and as a restorative in that state of debility which is the consequence of the disease long protracted, or of the mercurial irritation. With-

out allowing to it any specific power, it appears in such cases to be productive of benefit, probably from its mild demulcent and nutritious quality, and partly perhaps from the suspension of the use of mercury during its administration. It has also been recommended in extensive ulceration, in cutaneous affections, and in chronic rheumatism. It is given in the form of a decoction, and is frequently joined with guaiac and mezereon, the pungency of which it covers. The fluid extract is a fashionable remedy, and almost an inert one.

*Offic. Prep.*—Inf. sarsap. Dec. sars. Extr. sars. Ext. sars. fluid. Syr. sars.

TRITICUM HYBERNUM. Wheat. *Triand. Digyn. Gramineæ,* Linn. Juss. *Seminum farina, Amylum.* Starch.

STARCH, one of the most common of vegetable principles, is usually obtained from wheat flour by washing with cold water. The gluten of the flour remains in the state of a fibrous mass, the starch diffuses itself through the water, subsides on standing, and is obtained in the form of a brilliant white powder. Its distinguishing character is that of being insoluble in cold water, but readily soluble in that fluid when hot, and from this solution it does not separate on cooling. The solution of starch is gelatinous, and is used as a demulcent; it is sometimes given as an enema in tenesmus, and is the common vehicle for giving opium under that form. Starch powder is sometimes used to facilitate friction on the skin, when this is employed as a method of discussing indolent tumours.

Hordeum distichon, Barley, belongs to the same family as wheat. It consists chiefly of starch, with less gluten than exists in wheat. A decoction of it (barley water) is commonly used as a diluent and demulcent.

MARANTA ARUNDINACEA. Indian Arrow-root. *Monand. Monog. Scitimineæ. South America.*

THIS plant is cultivated in several of the West India islands for the preparation of the starch which is extracted from its root. The root, freed from the cuticle, is grated down in water, which is poured off repeatedly, allowing the starch to subside; when it appears to be perfectly purified the remaining water is strained off in a linen cloth, and the starch is dried. Such is the manner in which the true arrow-root is prepared, but what is sold under that name in this country is the starch of the potatoe, which indeed differs very little from arrow-root. The starch is used as a demulcent in diarrhœa and dysentery, and as a nutritious article of diet for convalescents. A jelly is prepared by boiling with water or milk, and it is under this form that it is taken.

SAGO is another form of starch obtained from the pith or medullary part of the branches of the Cycas circinalis, an Indian plant. The pith is macerated in water, and the starch is separated in grains of a brownish-colour, without taste or smell. Boiled in milk or water it dissolves entirely; and this with sugar, and the addition frequently of a little wine, forms a nutritious jelly, prescribed in diar-

rhœa as a demulcent, and in convalescence as a nutritious article of diet, easy of digestion.

Salop is procured from the root of an indigenous plant, the Orchis Mascula, by maceration in water, and beating. Its properties are similar to those of sago and arrow-root ; but it is of a different nature, consisting almost entirely of the principle named Bassorin, which seems to be intermediate between gum and sugar.

Saccharum officinarum. Sugar-cane. *Triand. Digyn. Gramineæ*, Linn. Juss. *Succus concretus.* Sugar. *East and West Indies.*

Sugar, which is so useful as a condiment, and a nutritious article of food, is obtained from the juice of the sugar-cane, a plant belonging to the important family of grasses. The juice expressed from the ripe cane is boiled down with lime, which saturates any vegetable acid that is present, till the sugar concretes in crystalline grains ; these are yellowish and somewhat deliquescent, forming *muscovado* or raw sugar ; the uncrystallizable portion of juice which remains is named *molasses* or *treacle.* The raw sugar is brought to this country, and refined by being again boiled with lime, and blood added to the hot solution, which coagulating, carries down with it the impurities. The sugar is thus procured in white porous masses. By slow evaporation it may be obtained in rhomboidal crystals, termed Sugar-candy. The composition of sugar has been already stated (p. 39). Sugar is phosphorescent by friction, inflammable, very soluble in water, whether cold or warm, and soluble in heated alcohol.

In the form of syrup, sugar is added to other remedies, to conceal their taste and add some degree of demulcent quality. The coarser kinds are slightly laxative. It is used as an errhine, is an antidote to salts of copper, and is employed to stimulate mechanically ulcerated surfaces. In hospitals molasses is commonly used instead of sugar.

*Offic. Prep.*—Syrupus simpl.

Arctium lappa. Burdock. *Syngen. æqual. Compos. Cynarocephalæ*, Juss. *Radix, Semina.*

This shrub is indigenous : the root has a mucilaginous sweetish taste, and consists chiefly of inulin, a principle very similar to starch. The decoction of the root has been given in gout, rheumatism, and venereal complaints, with much the same effect as the decoction of sarsaparilla. The seeds are bitter, and have some diuretic power, but are never used.

The root of another plant of the same family, Inula helenium, Elecampane, consists principally of inulin, which differs from starch in being deposited from the hot solution as it cools. Along with inulin the root contains essential oil, which gives it a weak aromatic quality ; but it is never used except in the confection of pepper, where it might be dispensed with.

Lichen islandicus. Cetraria islandica. Iceland Liverwort. *Crytogamia. Algæ. Iceland.*

The different lichens contain starch, which is extracted by boiling in water. The lichen islandicus, so named, as being abundant in Iceland, though it is a native also of other countries of the north of Europe, consists principally of this, with a portion of extractive matter, having a degree of bitterness. The bitterness is removed by maceration in cold water, and then by decoction with water a gelatinous solution is obtained. This is used as an article of diet in the countries of which this lichen is a native ; and it has been introduced into medical practice as a demulcent, and a nutritious substance, easy of digestion : it has, from these qualities, been used with some advantage in hæmoptysis and phthisis.

*Offic. Prep.*—Decoct. lichenis island.

Cornu cervi rasura. Hartshorn Shavings. Cervus Elaphus. Cornu. *Mammalia. Pecora.*

The horns of the deer are similar to bone in composition, containing a considerable quantity of gelatin, along with phosphate of lime. They are freed from their outer rough covering, and the internal white part is rasped down for use. The shavings afford, by decoction in water, a transparent, colourless, and inodorous jelly, which, rendered grateful by sugar and a little wine, is used in diarrhœa and dysentery as a demulcent, and in convalescence as a light nutritious article of diet.

Ichthyocolla. Isinglass. Accipenser Sturio. *Pisces. Chondropterygii.*

Isinglass is obtained from the sound, and other parts of the sturgeon, as well as several other kinds of fish caught in the Volga, the Oby, and other rivers which flow into the Caspian or the Northern Ocean. The sound being well cleansed is freed from the thin membrane which covers it, is dried by exposure to the air, and is rolled up in a twisted form. It is of a fibrous texture, insipid and inodorous. It is nearly pure gelatin, is therefore almost entirely soluble in water by boiling, and forms a gelatinous solution, which has sometimes been employed as a demulcent ; and when rendered grateful by a little sugar and lemon juice, as a nutritive jelly, easy of digestion.

Amygdalus. Almond. *Icosandria, Monog. Pomaceæ,* Linn. *Rosaceæ,* Juss. *Fructus ; Nucleus ; Ol. Express. Syria, Barbary.*

There are two varieties of the Almond, the one sweet, the other bitter ; these are the produce of mere varieties of the same species, their production being dependent, it is said, on culture. They contain a large quantity of fixed oil, and, besides this, were supposed to consist chiefly of starch ; but the researches of Boullay and Vogel have shown that no starch exists in them, and that their chief constituent, next to the oil, is a principle named Vegetable Albumen. According to Boullay, 100 parts of the sweet almond consist of fixed oil, 54, albumen, 24, sugar, 6, gum, 3, lingin, 4, water and acetic acid, 4. The bitter almond is of much the same nature, with the addition of a volatile oil, which gives the acrid bitterness, and a

little prussic acid, on which the odour and some degree of narcotic power depend. The fixed oil of the almond is obtained by expression from the seeds, or by decoction of them in water. It is very similar to the olive oil, but purer and more free from any rancidity. In common with expressed oils it has the properties of a demulcent; and diffused in water by the medium of mucilage, or a few drops of alkaline solution, it is given in catarrh.

There is another mode in which this oil is given as a demulcent, more grateful,—that of emulsion. The sweet almonds, the external rind being removed by emersion in warm water, are triturated with water; the oil is diffused in the water by the medium of the albumen of the almond, and a milk-like liquor is formed, which is used as a pleasant demulcent and diluent, particularly to obviate strangury from the application of a blister. The oil of bitter almonds is an active poison from the prussic acid being associated with it; yet it is used extensively to give the flavour to noyau and ratafia, and has sometimes occasioned fatal accidents. Bitter almonds are sometimes taken as anthelmintic, but the use of them is unsafe.

*Offic. Prep.*—Emuls. amygd. Confect. amygd.

OLEA EUROPÆA. Olive oil. Oleum Olivarum. *Diand. Monogyn. Sepiariæ*, Linn. *Jasmineæ*, Juss.

THE oil obtained from the fruit of the olive by expression is of a light yellowish or greenish colour, without taste or smell, and possessed of the general properties of expressed oil. It is the oil of this class which is most commonly used in medicine. It is employed as a demulcent in catarrh and some other affections, diffused in water by the medium of mucilage, or by a very small quantity of one of the alkalis, forming what is called the oily mixture, and is thus taken in as large quantities as the stomach can bear: it may be doubted, however, whether with any advantage. It is employed to involve acrid substances which may have been introduced into the stomach. It is also given as an anthelmintic. Externally it is used as an emollient, applied by friction, or forming the basis of liniments and ointments.

CETACEUM. Spermaceti. Physeter Macrocephalus. *Mammalia. Cetaceæ.*

THIS fatty matter is obtained from the head of the particular species of whale above stated. The cavity of the head contains a large quantity of an oily fluid, from which, on standing, a concrete substance separates. This, freed from the oil by expression, and purified by melting and boiling with a weak alkaline solution, is the common spermaceti. It is in masses of a flaky texture, unctuous and friable; white, with some degree of lustre; and has neither taste nor smell. It is less unctuous than fixed oil or fat, and does not so easily unite with the alkalis. Its medicinal virtues are those of a mild demulcent, and as such it is given in catarrh and gonorrhœa, mixed with sugar, or sometimes diffused in water by the medium of the yolk of an egg. It enters as an unctuous substance into the composition of ointments.

*Offic. Prep.*—Cerat. simp. Cerat. cetac. Ung. cetac.

Cera. Wax.—This is a concrete substance of a particular nature, supposed to be collected by the bee from the antheræ of vegetables. The experiments of Huber appear, however, to have proved, that it can be formed by the bee from changes produced on its saccharine food. Still it is also a vegetable product. It forms a covering on the leaves, fruit, and flowers of many plants, and some, as the Myrica Cerifera, afford it in large quantity. Wax, in its chemical properties, resembles most nearly the expressed oils, differing from them principally in solidity, and in combining less readily with the alkalis. When merely melted from the comb it retains a portion of colouring matter, and forms yellow wax ; it has also an agreeable odour. It may be deprived of both by bleaching,—the wax being melted and cast into thin cakes, which are exposed to the action of light, air and humidity. It then forms white wax, which is harder and more brittle than the yellow, and rather less fusible.

Wax has been used as a demulcent in dysentery, being diffused in water by means of mucilage of gum arabic, the wax being first melted with a little oil, to facilitate its trituration ; but it has no particular quality to recommend it. It is used in the composition of ointments and plasters, communicating to them consistence and tenacity.

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# CHAP. XXI.

## OF EMOLLIENTS.

The class of Emollients, according to the definition given by Cullen, includes those medicines which diminish the force of cohesion in the particles of the solid matter of the human body, and thereby render them more lax and flexible. Their operation is evidently mechanical ; they are insinuated into the matter of the solid fibre, and either diminish its density, or lessen the friction between its particles. Hence they are useful where the fibres are rigid, or where they are preternaturally extended, and therefore afford relief when topically applied to inflamed parts, to tumours distending the skin, or where the skin is dry and rigid. There may be included under the same class, those substances which, applied to the surface, by their bland quality afford relief from irritation.

Heat conjoined with moisture is the principal emollient. Warm water is of itself useful ; but when applied by the medium of some vegetable substances, as in the different fomentations and cataplasms, it is more advantageous, as the heat is longer retained ; bread in crumbs, or the flour or meal of the common grains, forms the basis of the common cataplasm ; the flowers of chamomile, mallow, mullein, (Verbascum thapsus,) or the root of the carrot, (Daucus carota,) are also used as the vehicle for fomentations. The emollient power

is little increased by such additions, though some have supposed that the mucilaginous vegetables have some efficacy of this kind.

The other emollients are the oils, or unctuous substances; they are merely introduced by friction; and in distension of the animal fibre, as in dropsical swelling, afford some relief. Adeps suillus, Hog's lard, is the principal substance of this kind not hitherto noticed. It is the fat of the hog, freed from the cellular fibre. This is done by melting it with the addition of a little water, to prevent the heat from rising too high. When cold it becomes concrete; has all the properties of animal fat; and from its softness is adapted to the purposes of an external emollient application. It forms the basis of ointments, which are applied as a dressing to inflamed parts. Such compositions too are formed from the expressed oils, melted with a due proportion of spermaceti or wax; they prove useful in a great measure by excluding the air, while, from their smoothness and softness, they excite no irritation. The thick and bland liquid formed by the combination of lime-water with expressed oils, (Linimentum Aquæ Calcis,) is another emollient composition, employed as a soothing application to burns, and proving useful by a similar operation. There are some other unctuous substances which have been introduced for similar purposes; such as Palm Oil, an expressed oil nearly concrete, obtained from the kernel of the fruit of the Cocos Butyracea, a native of Brazil. It is obtained by decoction of the kernels bruised in water, the oily matter separating: it is of a lively yellow colour, and rather agreeable odour, and is applied as an emollient by friction. The oil of the Laurel Berry (Laurus Nobilis) is of similar qualities, and is obtained in the same manner, the berries bruised being boiled in water. It is concrete, of a yellowish-green colour, and has an odour slightly fragrant.

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# CHAP. XXII.

## OF ANTHELMINTICS.

Anthelmintics are remedies which expel worms from the intestinal canal. They have been supposed to produce this effect by various modes of operation, principally mechanical.

Some which are in rough particles, as iron or tin filings, or consist of sharp spiculæ, as the down of the dolichos pruriens, are supposed, by mechanical action, to dislodge from the mucus of the intestines the worms which are evacuated.

Other substances ranked as anthelmintics seem to have no other property than bitterness. By this quality they have been supposed to prove noxious to these animals. It has also been imagined, that so far as they prove useful, they do so by restoring the tone of the digestive organs; the production of worms being supposed to proceed from debility of these organs, in consequence of which,

either the food is not properly assimilated, or the secreted fluids poured into the intestines are not properly prepared.

Lastly, other remedies of this class apparently operate by their cathartic power. Those cathartics which discharge the mucus of the intestines, as gamboge, scammony, or calomel, have more peculiarly this effect. One remedy, which is indeed the most efficient of this class, oil of turpentine, acts as a specific poison to the worm.

After a course of those anthelmintics which are not directly cathartic, it is usual to give a full dose of a purgative, which is even repeated two or three times, and to this a considerable share of the effect, when worms are evacuated, is probably to be ascribed. Calomel, with jalap, gamboge, or scammony, is the cathartic usually employed.

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## ANTHELMINTICS.

Hydrargyrum.
Ferrum.
Stannum.
Oleum oleæ europææ.
Oleum terebinthinæ.
Dolichos pruriens.
Artemisia santonica.
Spigelia marilandica.
Aspidium filix mas.
Tanacetum vulgare.
Geoffræa inermis.
Gambogia gutta.
Punica granatum.
Helleborus fœtidus.
[Melia azedarach.—b.]

Hydrargyrum. Quicksilver.

Several mercurial preparations have been employed on account of their anthelmintic power. The black bi-sulphuret, Ethiops Mineral, has been given in the dose of a few grains to children, and of a scruple or half a drachm to adults. Mercury has been supposed to prove noxious to the class of vermes, and from this any efficacy belonging to this preparation has been inferred to arise. There is another mode in which it may operate. Sulphuretted hydrogen is deleterious to animals of this class, and the natural sulphureous waters impregnated with it hence sometimes prove powerfully anthelmintic. The sulphuretted mercury may, by its chemical action on the fluids of the intestines, cause a production of sulphuretted hydrogen, whence may arise its anthelmintic power. Of the other mercurials calomel has the advantage, besides any direct anthelmintic power it may exert, of exciting the action of the intestines, and evacuating the intestinal mucus. It is given alone in a dose of one or two grains to children, and of from five to ten grains to an adult; or in smaller doses combined with jalap, scammony, or gamboge.

Ferrum. Iron.—The filings of this metal have been given as an anthelmintic in a dose of one or two drachms; and the sub-carbonate, or rust of iron, was highly recommended by Rush as a remedy

against the tape-worm, when taken to the extent of three or four drachms.

Stannum. Tin.—Tin is reduced to a powder, consisting of small rounded particles, by heating it nearly to its melting point, and agitating it briskly. Either this powder, or the metal in filings, has been employed as an anthelmintic, particularly in cases of tænia, in a dose of one or two drachms, a cathartic being administered after a few doses of it. Its effect has been supposed to be mechanical, dislodging the worm from the mucus of the intestines by the grittiness of its particles. But the use of it, as well as of most of the other remedies of this class, has been given up since the discovery of the greater power of oil of turpentine.

Oleum oleæ europææ. Olive Oil. Oleum Olivarum. *Diand. Monogyn. Sepiariæ. South of Europe.*

Olive Oil, or any expressed oil, taken in the morning to the extent of half a pound, or as much as the stomach can bear, has been said to prove anthelmintic; but in the state of diffusion in which it must act on worms in the intestines, it can scarcely be expected to have any power.

Oleum terebinthinæ. Oil of Turpentine.

This essential oil has been introduced as an anthelmintic of great power in expelling the tape-worm when given in large doses,—doses indeed so large, compared with those in which it has usually been given, that the practice would appear hazardous, though it is found to be perfectly safe. This use of it was accidentally discovered in consequence of a sailor swallowing a glass of oil of turpentine, mistaking it for gin. It was supposed that such a dose would prove fatal, but he suffered no inconvenience, and the evacuation of a tape-worm, from which his health had long suffered, was the result. The case was related by Dr. Fenwick, and the use of the oil as a powerful anthelmintic introduced. Two ounces are given as a dose, and if it is not evacuated by its cathartic action in an hour or two, the dose is repeated; it has been given to the extent of four ounces in a dose, without producing any injurious effect. The worm is always dead when it is evacuated, while, if removed by any other remedy, it retains signs of life. The oil, therefore, evidently operates by its deleterious power, first killing the worm, and then by purging expelling it. Indeed, oil of turpentine has been shewn by Dr. Traill (Edin. Phil. Jour. vol. xiv.) to be more noxious to all kinds of insects than any substance with which we are acquainted. It is found that large doses of turpentine are safer than small, the latter being apt to produce strangury, particularly it is said if cold water be drunk during its operation. The large doses only produce an appearance of inebriation and purging, (see p. 200). The oil has been since used as a remedy against other intestinal worms, and proves successful in killing and expelling lumbrici.

Dolichos pruriens. Cowhage. *Diadelph. Decand. Papilionaceæ,*

Linn. *Leguminosæ,* Juss. *Pubes leguminis rigida. East and West Indies.*

The down which covers the outer surface of the pods of this plant consists of spiculæ, so sharp, that if incautiously handled they penetrate the cuticle, and occasion severe itching and inflammation. It is this down which is used as an anthelmintic. It is made into an electuary with syrup or molasses, of which two tea-spoonfuls are given to an adult, and repeated two or three times, a strong cathartic being afterwards exhibited. Its action is mechanical, the spiculæ producing irritation in the body of the animal, causing its motion, and perhaps also exciting the action of the intestines. In the West India Islands it is the common anthelmintic, and is described as being given with much advantage, more so than when used in this country, —a difference which has been explained from the state of the mucous secretion in the intestinal canal, which appears to be more abundant in warm climates, and hence more powerful remedies are required to produce an anthelmintic effect. The electuary ought to be prepared only when it is to be used.

Artemisia santonica. Wormseed. Tartarian Southernwood. *Syngen. superfl. Composit. Corymbif.,* Juss. *Persia.*

The seeds of this plant have a faint disagreeable smell, and a very bitter taste. They are in common use as an anthelmintic, and probably operate merely as a bitter ; the dose is half a drachm, or a drachm of the powder to an adult. This, after being continued for some time, is followed by a dose of a strong cathartic.

Spigelia marilandica. Carolina Pink. *Pentand. Monogyn. Stellatæ,* Linn. *Gentianæ,* Juss. *Radix. North America.*

This plant is a native of Virginia and Maryland. The slender stalks of its root have a bitter taste, and are used in medicine, on the supposition of their anthelmintic power ; in a large dose they prove purgative, but in smaller quantities they are highly narcotic, its purgative qualities preventing its narcotic action on the system when given in large quantities. They are usually administered in the form of the watery infusion, in the quantity of half a drachm, or even to the extent of two or three drachms to an adult. Its operation as a narcotic has been said to occur from its administration ; and to prevent this, it has been recommended to be given rather in large doses, so as to obtain its cathartic operation, by which its narcotic power is obviated. In its dried state, however, in which it is employed in this country, no alarming symptom ever appears to follow from its administration.

Aspidium filix mas. Male Fern. *Cryptogamia, Filices. Radix. Indigenous.*

The root of this plant was once highly celebrated as a remedy against the tape-worm ; two or three drachms of the powder of it being taken in the morning, and a strong cathartic of jalap or gamboge given soon after it. The efficacy of the prescription probably depended on the cathartic. M. Peschier, however, affirms that it

has a real anthelmintic power, if the genuine plant be used, gathered at the proper season.

TANACETUM VULGARE. Tansy. *Syngen. Polyg. superf. Compositæ Corymbif.*, Juss. *Indigenous.*

THE leaves and flowers of this plant have a strong bitter taste. They have been recommended as anthelmintic, and especially as capable of expelling the lumbrici, and both they and the seeds are sometimes used as a popular remedy. The dose, in powder, is from one scruple to one drachm.

GEOFFRÆA INERMIS. Cabbage Tree. *Diadelph. Decand. Papilionac.* Linn. *Legumin.*, Juss. *Cortex. Jamaica.*

THE bark of this tree is flat and thin, of a brownish colour: it has an unpleasant smell, with a sweetish taste. It is used as an anthelmintic, and has been considered as one of considerable power, especially in expelling the lumbrici. It is usually given under the form of decoction, (Decoct. geof.) an ounce being boiled in two pounds of water to one pound, and from one to two ounces of this being given as a dose to an adult. It operates for the most part as a cathartic, and in an over-dose is liable to occasion sickness and vomiting. The same symptoms are said to be induced by the incautious drinking of cold water during its operation. When they occur from either cause, they are relieved by a dose of castor oil. Others, however, have not observed these effects from it, even when it has operated powerfully as an anthelmintic, and have hence concluded that it acts as a specific poison to worms.

GAMBOGIA.—Gamboge has been celebrated as a remedy against the tape-worm, and, by its powerful cathartic operation, is sometimes successful in expelling it. It is given in a dose from 5 to 20 grains alone, or combined with two parts of super-tartrate of potash. It is frequently also given as a cathartic after other anthelmintics.

PUNICA GRANATUM. Pomegranate. *Icosand. Monog. Pomaceæ*, Linn. *Myrtaceæ*, Juss. *Baccæ tunica. Radix. South of Europe.*

THIS is a low tree, bearing fruit about the size of an orange. The pulp of the fruit has an agreeable acidulous taste, by which it is well adapted for allaying thirst, and is used as a refrigerant in fevers. The pericarp and the root are astringent, containing a large proportion of tannin, with resin, mucus, and extractive matter, and have been used in diarrhœa, but more particularly as a remedy against tape-worm. Two ounces of the dried root are boiled down in two pints of water to 12 ounces, and of this decoction two ounces are taken every half hour. This is to be repeated on several successive days till the worm is discharged, castor oil being given after the first quantity of decoction. This is a favourite remedy against tænia in the East, and seems to have been known to the ancients; it is not apparent how it can act more effectually than any other astringent; yet it is said to be sometimes successful.

Helleborus fœtidus. Stinking Hellebore.—The leaves of this kind of hellebore are a popular remedy to destroy worms; they exert a violent cathartic and emetic action, and are so uncertain and hazardous in their operation that they should never be employed.

[Melia Azedarach. Pride of China. China tree. Poison berry-tree. *Decand. Monogyn.* Nat. Ord. *Meliaceæ. Cortex Radicis.*

This plant is a native of the East Indies, from whence it was introduced into Europe and North America. It is now completely naturalized in this country, and flourishes luxuriantly in the Southern States, especially Georgia and Carolina. The part used in medicine is the bark of the root. It is a powerful anthelmintic, and is much used and highly esteemed by the physicians at the South. It affects the system in a way very similar to the Spigelia Marylandica, producing not unfrequently confusion of the head, stupor, trembling of the hands, &c. This is particularly the case if it be used in the months of March and April, when the sap rises in the tree. Besides this narcotic effect, the melia also proves slightly purgative. It has been found principally successful against the round worm, though in some cases it has proved effectual also against the Tænia. It is generally given in the form of decoction: to prepare this, three or four ounces of the bark of the fresh root are put into a quart of water and boiled down to a pint; of which ℥ss to ℥j may be given every two or three hours till it operates. When administered in this way, it frequently causes both purging and vomiting.—B.]

# PART II.

# OF PHARMACY.

# PART II.

## OF PHARMACY.

The objects of Pharmacy are, the Preservation, Preparation, and Composition of Medicines. Substances in the state in which they are afforded by nature are seldom fit for administration as remedies in disease. They must be subjected to certain processes, to prevent their virtues being lost by spontaneous change, to concentrate or to modify their powers. Pharmacy, regarded as an art, prescribes the rules by which the operations for the attainment of these objects are conducted, and, as a science, unfolds the principles on which they depend.

The Preservation of Medicines is, generally speaking, the least important part of Pharmacy. Those which are most liable to decomposition are the vegetable products, many of which, especially when the reaction of their elements is favoured by humidity, suffer such changes as weaken their medicinal properties. Changes, productive of the same result, are not unfrequently occasioned by the action of air and light. The methods by which these are counteracted, of which the most important is Exsiccation, belong to this division of Pharmacy. It includes, too, the few general rules which are observed in collecting plants in that state of vigour and maturity in which they are possessed of the greatest degree of activity ; and there belong to it also those operations which are necessary to preserve unaltered the few animal products employed in medicine.

Under the second branch of Pharmacy, the Preparation of Medicines, are included a number of important operations, agreeing in general in affording substances different, more or less, in chemical constitution, from the substances operated on.

The medicinal powers of vegetable substances frequently reside in proximate principles, which, from their relations to certain solvents, can be separated from each other ; and thus, in many cases, the principle on which the medicinal activity of the substance depends can be obtained in a pure, and, if necessary, in a concentrated state. Resins, for example, are dissolved by alcohol, gums by water, extractive matter by either of these liquids, or by a mixture of both ; and by this separation important advantages may be obtained ; the medicine is rendered more certain in its operation : it is more easily preserved, or more conveniently administered. On this are founded the various pharmaceutic preparations of infusions, decoctions, tinctures, medicated wines or vinegars, and extracts ;—forms under which medicines are often employed in preference to their natural state.

The proximate principles of plants are sometimes obtained apart by other processes, as by distillation, or even by mechanical expression, whence other forms of preparations are obtained.

To this division belong too the Saline and Metallic Preparations. These are entirely the results of chemical processes; they are new remedies formed by chemical combination, and are possessed of properties altogether different from those of the substances from which they are prepared.

In all these preparations chemical changes are produced to a greater or less extent. Medicines are also, however, frequently given in a state of mixture, in which they either exert no mutual chemical action, or none producing any modification of their powers. This forms what is named Composition in Pharmacy. It is employed with different views; sometimes, for example, to conceal a medicine, to render it less unpleasant, or to give it a convenient form; and frequently more important advantages are attained; the action of one medicine on the system, or on a particular organ, so far cooperating with that of another, as to render its operation more certain, or more powerful, or even sometimes giving rise to such a modification, as to produce an effect different from that which would be obtained from the action of either.

Pharmacy, as practised in this country, is regulated by the Pharmacopœias of the respective Colleges. I have therefore, in the following pages, given translations of the various processes which these include, adding such remarks as may elucidate the chemical changes which they involve, or their effects on the medicinal properties of the substances employed. The order is that of the Edinburgh Pharmacopœia.

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## CHAP. I.

### VEGETABILIUM EXSICCATIO—DRYING OF VEGETABLES.

VEGETABILIUM EXSICCATIO. The Drying of Vegetable Substances. Edin.

"Herbs and flowers are to be dried with the gentle heat of a stove, or a common fire, in such a quantity that the drying may be performed as quickly as possible. Their virtues are thus best preserved; the mark of which is their retaining completely their native colour.

"The leaves of hemlock, (*conium maculatum*,) and others containing a subtile volatile matter, are, immediately after drying, to be rubbed to powder, and kept in glass vessels well stopt.

"The root of the sea-squill, after having removed its external coat, is to be first cut transverely into thin slices. The mark of it being properly dried is, that it should retain its bitterness and acrimony, though rendered friable."

HERBARUM EXSICCATIO. Drying of Herbs. Dub.

"Let the recent leaves of the herb, gathered when in flower, be put into paper bags, and exposed to a low degree of heat for an hour; then spread them lightly on a sieve, and dry them as quickly as possible, taking care that their colour is not injured by too high a heat: if they are to be used under the form of powder let them be reduced to powder immediately, and let this be kept in opaque phials well closed.

"Herbs and flowers, from which oils and distilled waters are to be procured, ought to be dried as soon as they are gathered."

VEGETABILIA. Vegetables. Lond.

Vegetables are to be gathered in their native soil and situation, in dry weather, when they are neither wet with rain nor with dew; this is to be done every year, and those which have been kept longer than a year are to be thrown away.

Most roots are to be dug up before their leaves or stalks shoot.

Barks should be gathered when they are most easily separated from the wood.

Leaves should be taken after the flowers have faded, and before the seeds ripen.

Flowers are to be gathered when newly opened.

Seeds should be collected when ripe, and before they fall, and are to be kept in the seed vessels.

By drying herbs and flowers, or expelling a great part of the water they contain, those spontaneous chemical changes which are favoured by humidity are prevented, and they are rendered capable of being preserved. The more quickly they are dried they retain in general their virtues more completely, care only being taken that too much heat be not applied, as, from this, part of their volatile principles would be dissipated, and their flavour and medicinal qualities impaired. Even when dried they suffer some changes in keeping, probably from the action of the air and light; and some do so more rapidly than others. Hemlock, in particular, has its colour and odour impaired in a very short time; it is therefore necessary to exclude it from the air, and likewise from exposure to light.

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## CHAP. II.

### PULPARUM EXTRACTIO—EXTRACTION OF PULPS.

PULPARUM EXTRACTIO. Extraction of Pulps. Ed.

"Those fruits which afford a pulp, if they are unripe, or if ripe and dry, boil with a little water, that they may become soft. Then express the pulp through a hair-sieve, and boil it with a gentle heat in an earthen vessel, stirring it frequently that it may not burn, until it attain the consistence of honey.

"The pulp of cassia fistula is to be boiled from the bruised pod;

and then, by evaporating the water, to be reduced to the due consistence, The pulps of ripe and fresh fruits are to be pressed through a sieve, without previous boiling."

Pulparum extractio. Extraction of Pulps. Dub.

"Fruits, the pulps of which are to be extracted, if they are unripe, or if ripe and dry, are to be boiled with a small quantity of water until they become soft. The pulps being pressed through a hair-sieve, are to be evaporated to a proper consistence, by a slow evaporation."

Vegetabilium præparatio. Preparation of Vegetables. Lond.

"Vegetables, soon after they are collected, those excepted which are to be used in the recent state, are to be spread out lightly, so as to dry as quick as possible, with a heat so gentle that their colour may not change; they are then to be kept in proper vessels, or situations where the access of light and humidity may be excluded.

"Roots, which are ordered to be kept fresh, ought to be buried in dry sand. The root of squill, before drying it, is to be cut transversely into thin slices, the outer dry layers being removed.

"Pulpy fruits, if they are not ripe, and if ripe and dry, are to be exposed in a damp place until they become soft, then press out the pulp through a hair-sieve, afterwards boil with a gentle heat, stirring frequently; lastly, dissipate the water by the heat of a water-bath, until it has become of the proper consistence.

"On the pods of cassia bruised pour boiling water, so as to wash out the pulp, which press first through a sieve with large holes, afterwards through a hair-sieve, then evaporate the water by the heat of a water-bath, until the pulp attain the proper consistence.

"Press the pulp or juice of ripe and fresh fruits through a sieve, without any previous boiling."

These directions are given principally for the preparation of the pulps of several fruits which enter into the composition of the Electuary of Senna. Pulps are seldom otherwise medicinally employed, and they cannot be long preserved unchanged. The direction in the London Pharmacopœia to place them in a damp place, when it is wished to soften them, is objectionable, as they will be liable to become mouldy: the softening them by boiling water is the preferable mode.

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# CHAP. III.

## CONSERVÆ—CONSERVES.

Conserves are compositions of fresh vegetable matter with sugar. The form is designed to preserve such vegetables as lose their virtues by drying; sugar in some measure counteracting the spontaneous decomposition to which vegetable matter is liable in a humid state. For this purpose, about three times the weight of the

vegetable of refined sugar is employed. Its operation, however, is but imperfect: the powers of any active vegetable can scarcely be preserved unimpaired for any length of time in this form; and, therefore, there is no conserve ordered in the Pharmacopœias of any powerful medicine; those which are inserted being merely recommended by their agreeable flavour, and being not used but as vehicles for the exhibition of more active remedies, under the form of bolus, pill, or electuary.

The London College have united the Conserves with the preparations named Electuaries, and have given them the common name of Confection,—improperly, as conserves are compositions of fresh vegetables with sugar added to prevent decomposition, whereas electuaries are composed usually of dry powders, with syrup added to give merely a convenient form.

Conserva citri aurantii. Conserve of Orange-peel. Ed.

"Grate the outer rind of the orange, beat it into a pulp, and during the beating add three times the weight of refined sugar."

Confectio aurantiorum. Confection of Orange-peel. Lond.

"Take of the exterior rind of the orange fresh, separated by a grater, a pound; refined sugar, three pounds. Bruise the rind in a stone-mortar with a wooden pestle, then adding the sugar, bruise again until they unite into a mass."

Conserva rosæ caninæ. Conserve of Dog-hip. Ed.

"Beat ripe dog-hips, carefully freed from the seeds and included down, into a pulp, and during the beating add three times the weight of refined sugar."

Confectio rosæ caninæ. Confection of Dog-hip. Lond.

"Take of the pulp of the dog-hip a pound; refined sugar, beat down, twenty ounces. Expose the pulp in a water-bath to a gentle heat, then gradually add the sugar, and rub them together till they form an uniform mass."

Conserva rosæ gallicæ. Conserve of Red Rose. Ed.

"Beat the petals of the red rose to a pulp, and during the beating add three times the weight of refined sugar."

Confectio rosæ gallicæ. Confection of Red Rose. Lond. Conserva rosæ. Conserve of Roses. Dub.

"Take of the petals of the red rose-buds, with the heels removed, a pound; refined sugar, three pounds. Bruise the petals in a stone mortar, then, adding the sugar, beat again until they form an uniform mass."

Of the above Conserves, that of Orange Peel is so little used, that it is seldom to be found in the shops. The Conserve of Doghip is smooth and uniform in its consistence, and is therefore well adapted to the purpose to which it is applied, that of serving as a vehicle for active medicines under the form of bolus or pill. The Conserve of the Petals of the Red Rose is supposed to retain their slight astringency, and, at one time, was celebrated as a remedy in hæmoptysis and phthisis. It is still a popular medicine in these diseases, being taken in the dose of an ounce in the morning, diffused in warm milk.

# CHAP. IV.

## SUCCI SPISSATI—INSPISSATED JUICES.

The juice expressed from succulent vegetables frequently holds dissolved, or diffused through it, the principles in which the medicinal powers of the plant reside; gum, starch, resin, extractive matter, tannin, vegetable alkalis, and other peculiar principles. But containing a large proportion of water, and being liable to decomposition, the process of inspissation is employed to obtain the active matter in a more concentrated state, and to obviate this spontaneous change. The preparations thus obtained are named Inspissated Juices, formerly Extracts.

In the greater number of cases, however, this operation cannot be performed without injury to the active matter. Any volatile principle is necessarily dissipated; hence the juices extracted from aromatic and odoriferous herbs have scarcely any of the flavour or virtues of the plants; and even where there is no injury of this kind, the vegetable matter, at the temperature necessary for the evaporation, suffers decomposition, either from the reaction of its elements, or from the chemical action of the oxygen of the air. Extractive matter, such as that contained in the juices of plants, becomes insoluble from mere exposure to the air, as Vauquelin observed: this change takes place more rapidly at the temperature of boiling water, as Fourcroy has shewn; and T. Saussure, who examined these changes more minutely, found that they are accompanied with an absorption of oxygen from the air, and a formation of carbonic acid, with probably, likewise, as he inferred, a formation of water from the union of part of the oxygen and hydrogen of the vegetable matter. Such changes must give rise to alterations in the medicinal powers of these substances, and hence we cannot rely on the activity and uniformity of operation in these inspissated juices. Even after they are prepared, too, they continue to suffer spontaneous decomposition, and their activity diminishes, therefore, with their age.

The following general directions are given for preparing inspissated juices.

Succi spissati. Inspissated juices. Ed.

"The fresh substance is to be bruised; and being inclosed in a hempen bag, is to be pressed strongly, that it may give out the juice, which is to be reduced by evaporation in open vessels, heated by boiling water, saturated with muriate of soda, to the consistence of thick honey. The mass, after it has cooled, is to be kept in glazed earthen vessels, and moistened with alcohol."

Succi spissati. Inspissated Juices. Dub.

"The leaves used in the preparation of inspissated juices should be collected at the time of inflorescence, when the flowers are be-

ginning to appear. The inspissation is best performed by evaporating the superfluous moisture with a moderate heat, by a vapour-bath, and constantly stirring them towards the end of the process."

The London College include the Inspissated Juices among Extracts, and give the following directions for the preparation of them: "Bruise the recent leaves in a stone-mortar, sprinkling upon them a small quantity of water; then express the juice, and, without any defecation, evaporate it, in a broad shallow basin, by the heat of a water-bath, until the consistence is that fit for forming pills, stirring constantly with a spatula towards the end of the evaporation." The direction not to defecate the juice is judicious, for it is known that the sediment from juices often contains much of the active matter.

Mr. Barry obtained a patent for a method of preparing inspissated juices, by evaporating juices at a low temperature *in vacuo*, which affords them of a very superior quality; the production of empyreuma is avoided, and there is less risk of active ingredients being dissipated by the heat, or decomposed by mutual reaction at a high temperature.*

The following table by M. Recluz exhibits the quantity of inspissated juice of pilular consistence obtained from 16 ounces troy of bruised vegetables, and the appearance of the inspissated juice after being kept for a year.

| Plant. | Part. | Product. | | Final consistence. |
|---|---|---|---|---|
| | | oz. | dr. | |
| Atropa belladonna, .... | Leaves | 1 | 3 | Very soft. |
| Conium maculatum, ... | Herb | 1 | 0½ | Pilular. |
| Datura stramonium, ... | Leaves | 0 | 4 | Very soft. |
| Hyosciamus niger, .... | Herb | 0 | 3 to 6 | Soft. |
| Momordica elaterium, .. | Fruit | 0 | 5 | Unchanged. |
| Rhamnus catharticus, .. | Fruit | 2 | 0 | Unchanged. |
| Sambucus nigra, ...... | Fruit | 2 | 0 | Unchanged. |

* The manner in which this process is conducted is the following: The evaporating pan, or still, is a hemispherical vessel of cast iron, polished within, and furnished with an air-tight flat cover.. From the centre of the cover a wide tube rises, which is bent downwards, and terminates in a copper globe, of a capacity three or four times greater than the still. In this tube there is a stop-cock between the still and the sphere. When evaporation is to be performed, the vegetable juice or infusion is poured into the still through a large aperture, which is closed so as to be air tight, and the still immersed in water. Steam is introduced from a boiler into the copper globe or receiver, till the air is expelled from it, which is known by the steam issuing uncondensed. The steam-pipe is closed, and cold water poured on the receiver, which condenses the steam, and produces a vacuum in it. The stop-cock that intercepts communication between the still and the receiver is now turned, and part of the air rushes out of the former into the latter. The same operation is performed six or seven times successively, by which the air is altogether drawn out of the still and the receiver likewise, and the juice evaporates *in vacuo*. Heat is applied to the water-bath in which the still is placed, until the juice begins to boil, which is ascertained by inspection through a piece of thick glass fixed in the upper part of the apparatus. Since in a vacuum fluids boil nearly 124 degrees below their usual boiling temperature, water passes into ebullition in such circumstances at about 90° of Fahrenheit; and it is never found necessary to heat the juice above a temperature of 100°. The evaporation is continued till the fluid is inspissated to the proper extent, which is judged of by its appearance through the glass.

Succus spissatus aconiti napelli. Inspissated Juice of Wolfsbane, Ed. Extractum aconiti. Extract of Wolfsbane, Lond. Succus spissatus aconiti. Inspissated Juice of Monks-hood, Dub.

"Take of the fresh leaves of Monks-hood, a pound. Having moistened the leaves with water, pound them in a mortar. Then express the juice, and without defecation reduce it to a proper consistence in the manner already mentioned."

This inspissated juice of the leaves is the form under which wolfsbane was introduced into practice by Stoërk. He recommended it in glandular swellings, scrofulous and venereal affections, gout and rheumatism, in a dose of a grain night and morning, gradually increased to 5 or 6 grains. It is very seldom prescribed.

Succus spissatus atropæ belladonnæ. Inspissated Juice of Deadly Nightshade, from the leaves. Ed. Dub. Extractum belladonnæ, Lond.

This has been recommended by the German practitioners in schirrus, cancer, in epilepsy and mania, in a dose of one grain, usually in the form of a pill, gradually increased. It retains the peculiar property of the plant, that of occasioning dilatation of the pupil, whence it has been prescribed in amaurosis, and has frequently been employed previous to the operation for cataract. An infusion of the dried leaves is more powerful and more certain.

Succus spissatus conii maculati. Inspissated Juice of Hemlock, from the leaves. Ed. Dub. Extractum conii. Lond.

Under this form, hemlock was employed by Stoërk in schirrus and cancer, (see p. 89). It retains the strong odour of the plant, and seems to be one of the most powerful of the expressed juices. It is always liable, however, to be uncertain in its strength, according to the heat applied in its evaporation ; it is also injured by keeping, sometimes, according to Mr. Barry, fermenting and evolving nitrous gas. It is therefore inferior to the dried leaves of the plant. Mr. Brande recommends that the juice, after being heated to boiling, be strained, then evaporated to the due consistence, and the matter left on the strainer, which has thus escaped long exposure to heat, added to it.

According to Dr. Fothergill, the proper time for gathering the leaves of this plant for medicinal purposes, and thus obtaining a medicine always nearly about the same strength, is when its flowers fade, the rudiments of the seed become apparent, and the habit of the plant inclines to yellow. The leaves should when gathered be dried before a gentle fire, be reduced to powder as soon as they are dried, and kept in small phials carefully secluded from the air and light. The proofs of their preparation and of their activity are the powder being of a lively green colour, and retaining the peculiar odour of the plant. Yet with all these precautions it cannot be procured always of the same strength ; and it is only from observing the effects it produces on the constitution, that we can determine whether it has been given in sufficient quantity. The effects usually observable, when a full dose has been given, are, giddiness, nausea,

tremors of the body, a gentle catharsis, and sometimes a peculiar heavy sensation about the eyes.

Succus spissatus hyoscyami nigri. Inspissated Juice of Black Henbane, from the herb. Ed. Dub. Extractum hyoscyami. Lond.

This inspissated juice retains a considerable degree of narcotic power, and is a form under which Henbane is occasionally employed as a substitute for opium. The dose has been usually one grain, increased to a scruple, commonly in the form of pills; two grains are perhaps not more than equivalent to one grain of opium. The tincture has been introduced as a more certain preparation.

Succus spissatus lactucæ sativæ. Inspissated Juice of Garden Lettuce, from the herb. Ed.

This preparation was strongly recommended by Dr. Duncan senior for its sedative properties. The general effects produced by it were nearly similar to those of laudanum. The dose in which it is given is from three to five grains.

Succus spissatus lactucæ virosæ. Inspissated Juice of Strong-scented Lettuce, from the herb. Ed.

This plant, though a narcotic, has been principally used as a diuretic. It was recommended as a remedy in dropsy by the German practitioners, in a dose of four or five grains, gradually increased to one or two drachms in twenty-four hours; in this country it has been little used.

Succus spissatus sambuci nigræ. Inspissated Juice of the Black Elder. Ed.

"Five parts of the juice of ripe Elder Berries, and one part of purified Sugar, are to be evaporated with a gentle heat to the consistence of thick honey."

Succus spissatus sambuci. Inspissated Juice of Elder. Dub.

"Let the juice from the fresh Berries of the Elder be prepared in the same manner as the inspissated juice of monks-hood."

This preparation has been given as an aperient or moderate laxative and diuretic, in a dose of half an ounce, or one ounce; but it possesses no quality to recommend it.

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## CHAP. V.

### OLEA FIXA SIVE EXPRESSA—FIXED OILS OR EXPRESSED OILS.

These Oils are denominated Expressed by the London and Dublin Colleges; but as several of the volatile oils are also obtained by expression, the Edinburgh College use the more exact term, Fixed, to distinguish from the volatile oils.

The fixed or expressed oils are distinguished by their unctuosity and insipidity, by being insoluble in water, and nearly so in alcohol, incapable of volatilization without change, and by combining with the alkalis, forming soaps.

The composition of all of them appear to be the same; they consist of 10 atoms of carbon, 1 of oxygen, and 11 of hydrogen. Their proximate principles are Elain and Stearin. Fixed oils exist in the fruit and seeds of vegetables, and are obtained by expression, or decoction with water. The former method is in general to be preferred; and to afford the oil pure, it must be performed without heat, which, though it favours the separation of the oil, communicates to it acrimony and an unpleasant flavour. The process, however, is seldom performed in the shops. To preserve them from becoming rancid, they ought to be kept secluded from the air, this change being produced in them by absorption of oxygen.

A process in Pharmacy somewhat difficult, is to mix these oils with any watery fluid, so that they may be conveniently exhihited. It is usually done by the medium of mucilage, or of an alkali. If triturated with mucilage, and a small quantity of sugar, the oil is diffused through the water, and a milky liquor is formed, in which, however, the diffusion is rather imperfect. A combinaton more complete and permanent is effected, by adding a few drops of water of ammonia, or two or three grains of sub-carbonate of potash, without the mucilage.

Oleum amygdalæ communis. Oil of Almonds. Ed.

"Bruise Fresh Almonds in a stone-mortar, inclose them in a hempen bag, and express the oil by a press without heat."

Oleum amygdalarum. Almond Oil. Lond.

"Macerate Almonds, either sweet or bitter, in cold water for twelve hours, and bruise them; then, without applying any heat, express the oil."

Oleum amygdalarum. Oil of Almonds. Dub.

"Bruise Fresh Almonds in a mortar, and express the oil without heat by a press."

This is the purest of the expressed oils, being free from odour or taste; it consists of Elain 76, and Stearin 24, in 100 parts. The almonds should be rubbed in linen, to take the brown crust off them. Those who prepare the oil on a large scale, blanch the almonds by steeping them for a little in boiling water; but the oil prepared from them is more apt to become rancid.

Oleum lini usitatissimi, Oil of Lintseed; Oleum lini.—This oil is directed to be expressed in the same manner, from the seeds of the plant. Being less pure, it is used only as an external application. Usually it is prepared on the large scale; and to remove the mucilage, heat is employed in the expression.

Oleum ricini. Castor Oil. Lond.—"Bruise the peeled seeds, and express the oil without any application of heat."

This oil is usually prepared in the West Indies by decoction, and is

milder than when obtained by expression. Hence in the Pharmacopœias of the other colleges, it is merely inserted in the catalogue of the Materia Medica.

This is the case too with the Olive Oil, Oleum oleæ europææ, which of all the expressed oils is most largely employed; it is imported from the South of Europe. The oil of the Bay-tree, (Laurus Nobilis,) is inserted in the Pharmacopœia as a fixed oil, but improperly, as it contains a large intermixture of volatile oil.

Croton oil is expressed from the seeds of the croton tiglium. Its violent cathartic powers have already been noticed.

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## CHAP. VI.

### EMULSIONES—EMULSIONS. EDIN.—MISTURÆ—MIXTURES. LOND.

Emulsions are preparations in which the expressed oil of the seeds or kernels, from which they are made, is diffused through water by the medium of the sugar and the vegetable albumen which the seeds contain. They may be made from lintseed, from the seeds of the poppy, and from other oily seeds; but almonds are always preferred, as being free from any disagreeable flavour or taste, and they afford a much more grateful form of preparation of an expressed oil than any other. They are employed as mere demulcents, and are always extemporaneous preparations. The oil being merely diffused through the water, they are opaque and milky, and, after some time, it begins to separate and rise like a cream to the surface; the same change is effected more speedily by heat. The fluid beneath is like whey in its appearance, and soon becomes acescent from the slow fermentation of the saccharine matter. The addition of vinous spirits, or of any weak acid, decomposes emulsions, separating the oil. In prescribing them, therefore, it is necessary to avoid combining with them any tincture, or any substance having acidity.

Emulsio acaciæ arabicæ. Arabic Emulsion. Ed.

"Take of the Mucilage of Gum-arabic, two ounces; Almonds, one ounce; Refined Sugar, half an ounce; Water, two pounds and a half. Macerate the almonds for a little in warm water and peel them, then carefully beat them in a stone-mortar, first with the sugar, and next with the mucilage, gradually adding the water, and strain the mixture through linen."

Emulsio arabica. Arabic Emulsion. Dub.

"Take of Gum-arabic, in powder, two drachms; Sweet Almonds, blanched, Refined Sugar, of each half an ounce; Water, a pint. Dissolve the gum in the water made hot, and, when it is cold, pour it gradually on the almonds previously pounded with the sugar, rubbing them at the same time together, so as to form a milky liquor, which strain."

This emulsion is used in the same cases as those following, and from the addition of the mucilage is supposed to have more demulcent power.

Emulsio amygdali communis. Almond Emulsion. Ed.

"Take of Sweet Almonds, one ounce; Purified Sugar, half an ounce; Water, two pounds and a half; blanch the almonds by steeping them for a little in hot water, and peeling them, then beat them carefully in a stone-mortar with the sugar, adding the water gradually, and strain the liquor."

Mistura amygdalarum. Mixture of Almonds. Dub.

"Take of Sweet Almonds, blanched, an ounce and a half; Bitter Almonds, two scruples; Refined Sugar, half an ounce; Water, two pints and a half. Triturate the almonds with the sugar, adding the water gradually, then strain."

Mistura amygdalarum. Mixture of Almonds. Lond.

"Take of Almond Confection, two ounces; Distilled Water, a pint; add the water gradually to the confection, during the trituration, until they mix, and then strain."

The almonds are blanched, or freed from their thin rind, by keeping them a minute or two in boiling water, after which the rind is easily detached. They require to be well triturated with the first portions of water as it is added. The formula of the London College affords a method of preparing the emulsion more easily, extemporaneously; but this is an advantage scarcely of sufficient importance to require an alteration of the mode of preparation; and the almond confection, if long kept, may be liable to spontaneous decomposition, and probably, from the sugar it contains, will become acescent, and therefore unfit for the preparation. The emulsion is used as a diluent and demulcent in catarrh and gonorrhœa, or, during the application of a blister, to prevent the occurrence of strangury, being drunk *ad libitum*, and it is more grateful than any other diluent. The addition of bitter almonds, in the Dublin formula, is to communicate an agreeable flavour.

Emulsio camphoræ. Camphor Emulsion. Ed.

"Take of Camphor, one scruple; Sweet Almonds, Refined Sugar, of each half an ounce; Water, a pound and a half. Beat the blanched almonds in a stone-mortar, with the camphor and sugar previously well rubbed together, gradually adding the water, then strain."

Camphor is less apt to occasion nausea or uneasiness in the stomach when given in a liquid than when in a solid form; and this is one of the best forms of preparation for its diffusion. Its dose is two ounces, given every four hours; but as this narcotic is not much employed internally in modern practice, the camphor emulsion is not often prescribed. This preparation should always be extemporaneous, as in the course of a few days the camphor separates, and rises to the surface. Camphor may also be suspended in a mixture, by rubbing it with magnesia, or with starch from flour.

MISTURÆ—MIXTURES.

To the preparations named Emulsions, the London College have extended the general name of Mixture, which is employed in Pharmacy to denote those preparations in which different ingredients are mingled together in the liquid form, or in which solid substances are diffused through liquids by the medium of mucilaginous or saccharine matter. And under the name of Mixture are inserted several compound medicines, both in the London and Dublin Pharmacopœias, of which it is necessary to take notice. Some of them had formerly a place in the Edinburgh Pharmacopœia; but they have been discarded, probably from the consideration that they must always be prepared extemporaneously, and may therefore be varied according to the intention of the prescriber.

Mistura ammoniaci. Gum-Ammoniac Mixture. Lond.

"Take of Ammoniac, two drachms; Water, half a pint. Triturate the ammoniac with the water poured on it gradually, until they are intimately mixed."

Mistura ammoniaci. Mixture of Ammoniac. Dub.

"Take of Gum-Ammoniac, one drachm; Penny-royal Water, eight ounces by measure. Rub the gum with the penny-royal water added gradually, until the mixture has the appearance of milk, which strain through linen."

In this mixture the resinous matter is suspended in the water by the medium of the gum, and a milky liquor is formed. From this the resin subsides slowly. Under this form the gum-resin is sometimes prescribed as an expectorant, the dose of the mixture being from half an ounce to an ounce: the bitter taste, however, of ammoniac renders it not so well adapted to its exhibition as the form of pill.

Mistura assafœtidæ. Assafœtida Mixture. Lond.

"Take of Assafœtida, two drachms; Water, half a pint. Rub the assafœtida with the water added gradually until they are perfectly mixed."

Mistura assafœtidæ. Assafœtida Mixture. Dub.

"Take of Assafœtida, a drachm; Penny-royal Water, eight ounces by measure. Rub the assafœtida with the water gradually added, until it form an emulsion."

The resin of the assafœtida is in this mixture likewise suspended in the water by the medium of the gum. It is a form under which this fetid drug is prescribed in the hysteric paroxysm, from half an ounce to an ounce being given and repeated at short intervals. Its operation as an antispasmodic is thus sooner obtained than when it is given in the solid form.

Mistura camphoræ. Camphor Mixture. Lond.

"Take of Camphor, half a drachm; Rectified Spirit, ten minims;

Water, a pint. Rub the camphor first with the spirit, then with the water gradually poured upon it, and strain."

MISTURA CAMPHORÆ. Camphor Mixture. Dub.

"Take of Camphor, a scruple; Rectified Spirit of Wine, ten drops; Refined Sugar, half an ounce; Hot Water a pint. Rub the camphor first with the spirit, then with the sugar; lastly, add the water while rubbing, and strain the mixture through bibulous paper.

WATER dissolves but a minute quantity of camphor, and in this mixture can be regarded only as receiving odour and some degree of taste, without any such impregnation as shall communicate to it medicinal efficacy. It serves, therefore, merely as a vehicle for other medicines.

MISTURA CAMPHORÆ CUM MAGNESIA. Camphor Mixture with Magnesia. Dub.

"Take of Camphor, twelve grains; Carbonate of Magnesia, half a drachm; Water, six ounces. Rub the camphor with the magnesia, adding the water gradually, and mix."

THIS mixture contains more camphor than the last, the magnesia rendering that principle more soluble. It is used as an antispasmodic, and is also a convenient form in which magnesia may be given in calculous disorders, where there is an excessive formation of uric acid.

MISTURA CORNU USTI. Mixture of Burnt Horn. Lond.

"Take of Burnt Horn, two ounces; Gum-Arabic in powder, one ounce; Water, three pints. Boil down to two pints, stirring constantly, then strain."

THIS is an absurd preparation, introduced at a time when the principles of Pharmacy were nearly unknown. The burnt hartshorn (which is chiefly phosphate of lime) is insoluble in water; the gum alone therefore is dissolved; the hartshorn, by the continued boiling, is diffused, and kept suspended by the mucilaginous liquid: but this might equally be done without this operation; and, when done, it can communicate to the preparation no medicinal power whatever. The Dublin College have rejected it.

MISTURA FERRI COMPOSITA. Compound Mixture of Iron. Lond. Dub.

"Take of Myrrh, in powder, one drachm; Sub-carbonate of Potash, twenty-five grains; Rose Water, seven fluid-ounces and a half; Sulphate of Iron in powder, one scruple; Spirit of Nutmeg, half a fluid-ounce; Refined Sugar, a drachm.

"Rub the myrrh with the spirit of nutmeg and sub-carbonate of potash, and, during the rubbing, add first the rose water with the sugar, and afterwards the sulphate of iron. Put the mixture immediately into a proper glass vessel, which stop closely."

THIS, with a few trivial alterations, is the celebrated Antihectic Mixture of Griffith; which, as first invented, was undoubtedly an unchemical mixture, the prescriber not being aware of the changes produced in the active ingredients by their mutual action, but which, in practice, was found possessed of some advantages. The sul-

phate of iron, it is obvious, is decomposed by the sub-carbonate of potash, the sulphuric acid combining with the potash, while the carbonic acid unites with the protoxide of iron. The myrrh combines with the alkali forming a saponaceous compound, in which proto-carbonate of iron is suspended, and, according to Dr. Paris, partly dissolved by the excess of alkali. This chalybeate proves less irritating than the sulphate of iron, producing no unpleasant effect on the stomach, and at the same time is more active than the common carbonate or rust of iron, in which the iron is at the maximum of oxidation, while, in the present preparation, it is at the minimum, is in a different state of aggregation, and probably combined with a larger quantity of carbonic acid. To preserve it in this state, it is ordered to be kept in a bottle closely stopt; but as iron has a strong tendency to become more highly oxidated, and suffers this change rapidly from the action of the air, it is preferable that the preparation should be extemporaneously made. Griffith's mixture is employed as a remedy in hectic fever, in some forms of phthisis and chronic catarrh, in chlorosis, and other diseases in which iron is given as a tonic, and is often attended with marked benefit. The mixture of the London Pharmacopœia is nearly of the same strength, and may be given in a dose of an ounce once or twice a-day. Mr. Brande recommends the addition of a drachm of spirit of nutmeg to each dose, as it feels cold on the stomach, and to prevent griping.

Mistura ferri aromatica. Aromatic Mixture of Iron. Dub.

"Take of Lance-leaved Cinchona, in coarse powder, an ounce; Colomba Root sliced, three drachms; Cloves bruised, two drachms; Iron-filings, half an ounce. Digest for three days in a close vessel, shaking occasionally, with as much peppermint water as will be sufficient to yield twelve ounces of liquor after straining; then add of compound tincture of cardamoms, three ounces, tincture of orange-peel, three drachms."

This must be a very weak chalybeate, as there is no solvent present to take up any large portion of iron; a little is dissolved by the cinchonic acid, giving a greenish-black colour to the mixture; yet Dr. Montgomery states that it is a useful tonic in dyspepsia. It is an old preparation, formerly known by the name of Heberden's Ink, and has been recently adopted by the Dublin College.

Mistura guaiaci. Guaiac Mixture. Lond.

"Take of the Gum-Resin of Guaiac, a drachm and a half; Refined Sugar, two drachms; Mucilage of Gum-Arabic, two fluid-drachms; Cinnamon Water, eight fluid-ounces. Rub the guaiac with the sugar, then with the mucilage, and add gradually, while these are rubbed together, the cinnamon water."

This is a convenient form for the exhibition of guaiac.

Mistura moschi. Musk Mixture. Lond.

"Take of Musk, Gum-Arabic powdered, Refined Sugar, of each one drachm; Rose Water, six fluid-ounces. Rub the musk with the sugar, then with the gum, and add gradually the rose water."

This ought to be an extemporaneous mixture, as the musk soon separates. Its dose is an ounce, or an ounce and a half.

Aqua picis liquidæ. Tar-Water. Dub.

"Take of Tar, by measure, two pints; Water, a gallon. Mix them, stirring with a wooden rod for a quarter of an hour; then, after the tar has subsided, strain the liquor, and keep it in well-closed vessels."

The water dissolves the empyreumatic acetic acid with a little of the empyreumatic oil of the tar, and from this impregnation acquires smell and taste, and a colour like that of white wine. Tar-water was at one time highly celebrated for its efficacy in many diseases, being drunk to the extent of a pound or two daily; it operates slightly as a diuretic and diaphoretic, but has long fallen into disuse.

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## CHAP. VII.

### INFUSA—INFUSIONS.

Infusion is a general term, which might be applied to that process by which the soluble parts of any solid are extracted by the action of any fluid kept in contact for some time with the body on which it acts. In Pharmacy it is usually limited to that case where the active matter of vegetable substances is extracted partially or completely by water. Infusions, therefore, are solutions of vegetable matter in water obtained by maceration.

Several of the principles of vegetables being soluble in water, they can often, by this operation, be extracted with advantage. But there are others with regard to which it is useless. Thus the astringent power of oak bark, or the purgative quality of rhubarb, is extracted by infusion in water; even the cathartic power of senna, though it appears to reside in a principle more peculiarly soluble in alcohol, is obtained by the action of water, when a large quantity is employed, and its solvent power is promoted by heat. But the power of jalap is scarcely procured, the watery infusion of it being comparatively weak. In prescribing infusions, therefore, regard must be had to the composition of the substance ordered to be infused. In general mucilaginous plants yield their mucilage readily to water: bitterness and astringency are also usually extracted by water with facility, and the aromatic quality where this resides in an essential oil. With regard to other properties, scarcely any general rule can be delivered. To any resinous substance aqueous infusion can never properly be applied.

The quantity and quality of the matter extracted by infusions are varied by the temperature of the fluid. Infusions with warm water are considerably stronger than those made with cold water; in some cases, however, especially with respect to bitters, they are less

grateful. In the infusion of gentian, therefore, of the Edinburgh Pharmacopœia, which is designed to be used as a bitter, cold water is directed to be used; in all the others, boiling water is ordered to be poured on the materials of the infusion, and the vessel is generally placed near a fire. Earthen vessels are commonly used; but metallic ones, with their outer surfaces polished and bright, will preserve the heat longer when warm water is used, and will therefore yield stronger infusions.

They are improper vehicles for most of the metallic salts, some of which, by the decompositions and precipitations which are produced by their mixture, are rendered nearly inert. It may be remarked, however, that it does not follow, from decompositions happening in a mixture, that it is in all cases an improper one, as some active and valuable preparations are formed with incompatible ingredients, which mutually decompose each other, and yet their conjunction is found to be beneficial.

Dried vegetables yield their virtues to water by infusion, more readily than when they are in the recent state, probably from the vegetable matter being more easily penetrated by the water.

Infusions are always injured by keeping. Though at first transparent, they soon become more or less turbid; they deposite a mucous-like substance, lose their peculiar taste, and after some time acquire a putrid smell,—changes owing to the gradual decomposition of the vegetable matter they hold dissolved. Infusions are therefore never kept ready prepared in the shops; they are to be regarded as extemporaneous preparations, which, in general, require several hours before they can be prepared.

Infusum acaciæ catechu. Infusion of Catechu. Ed.

"Take of Extract of Acacia Catechu in powder, two drachms and a half; Bark of Cinnamon bruised, half a drachm; Boiling Water, seven ounces; Simple Syrup, one ounce. Macerate the extract and bark with the water in a closed vessel, for two hours, then strain through linen, and add the syrup."

Infusum catechu compositum. Compound Infusion of Catechu. Lond. Dub.

"Take of Extract of Catechu, two drachms and a half; Cinnamon Bark bruised, half a drachm; Boiling Water, half a pint. Macerate for an hour in a vessel lightly closed, and strain through linen."

The extract of Catechu is entirely soluble in water. This preparation, therefore, possesses all its virtues unimpaired, and rendered more grateful, by the addition of the cinnamon. Hence it is one of the best forms under which catechu can be prescribed. Its principal use is as an astringent in diarrhœa, commonly after the acrid matter has been evacuated by the action of rhubarb and other purgatives: its dose, one ounce every third or fourth hour. A small quantity of tincture of opium is frequently added to it with advantage. It is better not to add syrup, as this renders the infusion more apt to spoil.

Infusum anthemidis nobilis. Infusion of Chamomile. Ed.

"Take of Chamomile Flowers, two drachms; Water, eight ounces.

Macerate for twenty-four hours in a vessel lightly closed, and strain."

INFUSUM ANTHEMIDIS (CHAMÆMELI. Dub). Infusion of Chamomile. Lond. Dub.

"Take of Flowers of Chamomile, two drachms; Boiling Water, half a pint. Macerate for ten minutes in a vessel lightly closed, and strain." ("Digest for twenty-four hours in a covered vessel, and strain through linen." Dub.)

UNDER the form of infusion, chamomile is used as a bitter in dyspepsia: it is more grateful when prepared with cold water, chamomile tea, as it is called, which is equal perhaps in efficacy to any other bitter. It is unnecessary to macerate longer than an hour. The infusion in warm water is generally employed to promote the operation of an emetic.

INFUSUM CASSIÆ SENNÆ. Infusion of Senna. Ed.

"Take of the Leaves of Senna, six drachms; Ginger Root bruised, one scruple; Boiling Water, nine ounces. Macerate for an hour, in a vessel lightly closed, and strain."

INFUSUM SENNÆ COMPOSITUM. Compound Infusion of Senna. Lond. Dub.

"Take of Senna Leaves, an ounce and a half; (an ounce, Dub.); Ginger root sliced, one drachm; Boiling Water, a pint. Macerate for an hour in a vessel lightly closed, and strain the liquor."

UNDER this form, senna may be given as a purgative, the dose being three or four ounces, with sometimes the addition of half an ounce of sulphate of magnesia. It is less grateful than the infusion of senna and tamarinds of the Edinburgh Pharmacopœia. The quantities in the second formula appear to be greater than are necessary, for there is no propriety in preparing more of the infusion than is required for a dose, as it suffers decomposion in a very short time.

INFUSUM CINCHONÆ LANCIFOLIÆ. Infusion of Peruvian Bark. Ed.

"Take of Lance-leaved Bark in powder, one ounce; Water, one pound. Macerate for twenty-four hours in a slightly covered vessel, frequently shaking, and strain."

INFUSUM CINCHONÆ. Infusion of Peruvian Bark. Lond.

"Take of Lance-leaved Peruvian Bark, bruised, half an ounce; Boiling Water, half a pint. Macerate for two hours in a vessel lightly closed, and strain."

INFUSUM CINCHONÆ. Infusion of Peruvian Bark. Dub.

"Take of Lance-leaved Bark in coarse powder, an ounce; Cold Water, twelve ounces, by measure. Rub the bark with a little water, and add the remainder during the rubbing; then macerate for twenty-four hours, shaking occasionally, and pour off the pure liquor."

THE cold infusion of bark contains little of its active matter, but is grateful and well suited to weak and delicate stomachs; hence it is sometimes prescribed as a bitter in dyspepsia in a dose of two ounces. A solution of sulphate of quinia is preferable, whenever the peculiar operation of bark is desired.

INFUSUM COLUMBÆ. Infusion of Columba. Ed.

"Take of Colomba Root sliced, one drachm; Boiling Water, eight ounces. Macerate for two hours in a vessel lightly closed, and strain."

INFUSUM CALUMBÆ. Infusion of Calumba. Lond. Dub.

"Take of Colomba Root cut, two drachms; Boiling Water, half a pint. Macerate for two hours in a vessel lightly closed, and strain."

THE active matter of colomba is imperfectly extracted by water; and this can be regarded only as a bitter infusion, which, like other bitters, may be used in dyspeptic affections. Its dose is one ounce of the London preparation, or two of the Edinburgh. To obtain the more active operation of colomba, it must be given in substance. As this infusion contains no astringent matter, it is not incompatible with preparations of iron. It is hence prescribed as a vehicle for any of these, particularly for the tincture of muriate of iron, when it is wished to conjoin them with bitters. Dr. A. T. Thomson recommends infusion of colomba for restraining the nausea and vomiting which attend pregnancy. It is liable to spoil very soon, especially in warm weather.

INFUSUM DIGITALIS PURPUREÆ. Infusion of Foxglove. Ed.

"Take of the dried leaves of Foxglove, one drachm; Boiling Water, eight ounces; Spirit of Cinnamon, one ounce. Macerate the leaves in the water for four hours in a vessel lightly covered, and, after adding the spirit, strain."

INFUSUM DIGITALIS. Infusion of Foxglove. Lond. Dub.

"Take of the dried leaves of Foxglove, one drachm; Spirit of Cinnamon, half a fluid-ounce; Boiling Water, half a pint. Macerate for four hours in a vessel lightly closed, and strain; then add the Spirit of Cinnamon."

THIS infusion, of which the formula was given by Dr. Withering, is the best form of administering digitalis as a diuretic: the addition of the aromatic is designed to counteract the nauseating and sedative effects. Its dose is an ounce taken twice a-day, and continued till the effects of the remedy appear.

INFUSUM GENTIANÆ COMPOSITUM, *vulgo Infusum Amarum.* Compound Infusion of Gentian. Ed.

"Take of Gentian Root cut, half an ounce; Dried Orange-Peel bruised, Coriander Seeds bruised, of each a drachm; Diluted Alcohol, four ounces; Water, one pound. First pour on the alcohol, and after three hours the water; then macerate without heat for twelve hours, in a vessel lightly closed, and strain."

INFUSUM GENTIANÆ COMPOSITUM. Compound Infusion of Gentian. Lond. Dub.

"Take of Gentian Root cut, Orange-Peel dried, of each a drachm; Fresh Lemon-Peel, two drachms; (one drachm, Dub.); Boiling Water, twelve fluid-ounces. Macerate for an hour, in a vessel slightly closed, and strain."

THIS bitter infusion is employed in dyspepsia; a sufficient quantity of alcohol is added to aid the solvent power of the water, and to

preserve the infusion from spontaneous decomposition, while there is not so much as to give spiritous pungency. It is therefore better adapted to continued use than the bitter tinctures. Its dose is two ounces occasionally. The London and Dublin Colleges omit the alcohol; and in an infusion, which may always be extemporaneously prepared, and does not therefore require to be long kept, this is perhaps preferable, as avoiding the pernicious consequences arising from the stomach being accustomed to the stimulus of ardent spirit.

INFUSUM LINI USITATISSIMI. Infusion of Lintseed. Ed.

"Take of Lintseed, an ounce; Liquorice Root, bruised, two drachms; Boiling Water, two pounds. Digest for four hours in a vessel lightly closed, and strain."

INFUSUM LINI COMPOSITUM. Compound Infusion of Lintseed. Lond. Dub.

"Take of Lintseed bruised, one ounce; Liquorice Root cut, half an ounce; Boiling Water, two pints. Macerate for four hours, nigh the fire, in a vessel lightly closed, and strain."

THE mucilaginous matter of lintseed is very readily dissolved by tepid water; and this forms a demulcent liquor, often taken with advantage in gonorrhœa, dysuria, and sometimes in catarrh. It is rendered rather more grateful by the addition of a small portion of lemon juice, and of the rind of the lemon with a little sugar.

INFUSUM QUASSIÆ EXCELSÆ. Infusion of Quassia. Ed.

"Take of Quassia Wood rasped, half a drachm; Boiling Water, eight ounces. Macerate for two hours in a vessel lightly closed, and strain."

INFUSUM QUASSIÆ. Infusion of Quassia. Lond. Dub.

"Take of the Wood of Quassia cut, one scruple; Boiling Water, half a pint. Macerate for two hours in a vessel lightly closed, and strain."

QUASSIA is a very pure bitter, and its bitterness is extracted by water, unmixed with either tannin, mucilage, or extractive, which usually accompany it in other tonics. Under this form it is used as a remedy in dyspepsia, and other disorders arising from debility of the alimentary canal. Its dose may be two ounces. As it is scarcely changed by any metallic preparations, it is often used as a vehicle for sulphate of zinc and the salts of iron. In the latter of the two formulas, the proportion of quassia is much too small.

INFUSUM RHEI. Infusion of Rhubarb. Ed.

"Take of the Root of Russian Rhubarb bruised, half an ounce; Boiling Water, eight ounces; Spirit of Cinnamon, one ounce. Macerate the root with the water in a closed vessel for twelve hours, then, adding the spirit, strain the liquor."

INFUSUM RHEI. Infusion of Rhubarb. Lond. Dub.

"Take of Root of Rhubarb cut, a drachm; Boiling Water, half a pint. Macerate for two hours in a vessel lightly closed, and strain."

THE infusion of rhubarb is supposed to have more of the purgative than of the astringent power. It is accordingly used as a mild ca-

thartic, in a dose of two or three ounces. There appears to be an unnecessary waste of rhubarb in the formula of the Edinburgh Pharmacopœia; and that in the London Pharmacopœia, in which only a drachm of rhubarb is ordered to eight ounces of water, will probably afford as much active matter as the water can dissolve, or, at least, will give an infusion sufficiently strong.

Infusum rosæ gallicæ. Infusion of Red Rose. Ed.

"Take of the Dried Petals of the Red Rose, one ounce; Boiling water, two pounds and a half; Dilute Sulphuric Acid, half an ounce; Refined Sugar, one ounce. Macerate the petals with the boiling water in an earthen vessel, which is not glazed with lead, for four hours, then, having poured on the acid, strain the liquor, and add the sugar."

Infusum rosæ compositum. Compound Infusion of Roses. Lond.

Infusum rosæ acidum. Acid Infusion of Rose. Dub.

"Take of the Dried Petals of the Red Rose, half an ounce; Boiling Water, two pints and a half, (three pints, Dub.); Diluted Sulphuric Acid, three fluid-drachms; Refined Sugar, an ounce and a half. Pour the water on the petals in a glass vessel; then drop in the acid, and macerate for half an hour.—Lastly, strain the liquor, and add the sugar to it."

This infusion is used principally as a refrigerant and as a moderately astringent gargle, in slight cases of cynanche, or to check salivation. It owes little else than colour, and a pleasant flavour, to the petals of the rose; the astringency and sub-acid quality depending almost entirely on the sulphuric acid. It is frequently used as a vehicle for sulphate of quinia and for the exhibition of cathartic salts, such as sulphate of magnesia.

Infusum sennæ compositum. Compound Infusion of Senna. Ed.

Infusum sennæ cum tamarindis. Infusion of Senna with Tamarinds. Dub.

"Take of Senna Leaves, one drachm; Preserved Tamarinds, one ounce; Coriander Seeds bruised, one drachm; Raw Sugar, half an ounce; Boiling Water, eight ounces. Macerate them in a close earthen vessel, which is not glazed with lead, shaking frequently, and, after four hours, strain. It may be made also with double or triple the quantity of senna."

This affords a purgative not ungrateful, mild in its operation, and not liable to excite nausea. The whole quantity may be taken at intervals as a dose. If a more powerful cathartic is indicated, it may be made with a larger proportion of senna. The direction of not infusing the materials in a vessel glazed with lead ought to be attended to, as by the acid of the tamarinds acting on the lead, the infusion might receive a noxious impregnation.

There are some infusions peculiar to the Dublin and London Pharmacopœias.

Infusum armoraciæ compositum. Compound Infusion of Horse-Radish. Lond. Dub.

"Take of fresh Horse-Radish Root cut, Mustard Seed bruised, of each one ounce; Compound Spirit of Horse-Radish, a fluid-ounce; Boiling Water, a pint. Macerate for two (six, Dub.) hours in a vessel lightly closed, and strain; then add the Compound Spirit of Horse-Radish."

Under this form the horse-radish may be prescribed in the diseases in which it is employed, more particularly as a stimulant in chronic rheumatism, paralysis, and some forms of dropsy, especially if they should occur after intermittents. Its dose is two ounces twice a-day. It soons spoils when kept. It is incompatible with the salts of mercury and with alkaline carbonates.

Infusum aurantii compositum. Compound Infusion of Orange-Peel. Lond. Dub.

"Take of dried Rind of the Orange, two drachms; of fresh Rind of Lemon, one drachm; of Cloves bruised, half a drachm; Boiling Water, half a pint. Macerate for a quarter of an hour in a vessel lightly closed, and strain."

This affords a bitter, grateful, and somewhat pungent to the taste, which may be employed with advantage in some forms of dyspepsia. Its dose is two ounces.

Infusum buchu. Infusion of Buchu. Dub.

"Take of Buchu Leaves, half an ounce; Boiling Water, half a pint. Digest for four hours, and strain through linen."

Lately introduced as a diuretic, and is beneficial in some diseases of the bladder.

Infusum caryophyllorum. Infusion of Cloves. Lond. Dub.

"Take of bruised Cloves, a drachm; Boiling Water, half a pint. Macerate for two hours in a vessel lightly closed, and strain."

The aromatic odour and pungency of the clove are extracted in this infusion: it may be used with advantage as a warm and grateful stimulant in some forms of dyspeptic affection, where a sensation of cold and uneasiness is felt at the stomach,—a state which is often produced where the habit of taking spiritous cordials has been indulged in. Its dose is a wine glassful. Mr. Brande recommends the addition of a little sub-carbonate of ammonia to it, as six grains to an ounce of the infusion.

Infusum cascarillæ. Infusion of Cascarilla. Lond. Dub.

"Take of Cascarilla Bark bruised, half an ounce; Boiling Water, half a pint. Macerate for two hours in a vessel lightly closed, and strain."

Cascarilla is a substance little valued in modern practice; and there does not appear to be much propriety in the introduction of this infusion as an officinal preparation. Its dose is two ounces. Dr. A. T. Thomson recommends it as a tonic for children.

Infusum cuspariæ. Infusion of Angustura. Lond.
Infusum angusturæ. Infusion of Angustura. Dub.

"Take of the Bark of Angustura bruised, two drachms; Boil-

ing Water, half a pint. Macerate for two hours in a vessel lightly closed, and strain."

The same remark nearly applies to this preparation as to the preceding one. Under this form, however, angustura may be occasionally used as a remedy in dyspepsia.

Infusum simaroubæ. Infusion of Simarouba. Lond. Dub.

"Take of the Bark of Simarouba bruised, half a drachm; Boiling Water, half a pint. Macerate for two hours in a vessel lightly closed, and strain."

Simarouba yields its bitterness to water; the infusion, however, is inferior to that of quassia, and does not appear to have any particular advantage to recommend it. It has been used in the latter stages of dysentery.

Infusum tabaci. Infusion of Tobacco. Lond. Dub.

"Take of the Leaves of Tobacco, one drachm; Boiling Water, a pint. Macerate for an hour in a vessel lightly closed, and strain."

This infusion is prepared of that strength which is proper for giving tobacco under the form of enema, as a narcotic in incarcerated hernia, or to produce evacuation from the intestines in ileus and obstinate constipation. It has been also used by Dr. Fowler as a narcotic diuretic in dropsies, and it is said with considerable advantage; it is generally, however, regarded as an uncertain and dangerous remedy.

Infusum menthæ simplex. Simple Infusion of Mint. Dub.

"Take of Mint Leaves dried, two drachms; Boiling Water, as much as is sufficient to afford six ounces of the infusion when strained."

Mint infusion taken warm may be used to favour diaphoresis, or as a vehicle for other remedies.

Infusum menthæ compositum. Compound Infusion of Mint. Dub.

"Take of the Leaves of Spearmint dried, two drachms; Boiling Water, as much as is sufficient to afford six ounces of infusion when strained. Digest for half an hour in a covered vessel; strain the liquor when cold, and add to it, of Double Refined Sugar, two drachms; Oil of Spearmint, three drops, dissolved in half an ounce of compound tincture of cardamom. Mix."

This is a grateful stomachic, which may be used to obviate flatulence, or as a vehicle to cover the taste of unpleasant medicines.

Infusum sarsaparillæ compositum. Compound Infusion of Sarsaparilla. Dub.

"Take of Sarsaparilla Root, previously cleansed with cold water, and then sliced, an ounce; Lime Water, a pint. Macerate for twelve hours in a close vessel, shaking occasionally, and strain."

Until it be ascertained whether the supposed virtues of sarsaparilla depend on some active principle in it, or are merely those of a common demulcent, we cannot well judge what is the best form of exhibiting it. It is affirmed that cold water extracts all the virtues,

while, on the other hand, Dr. Paris says of the decoction, that it is seldom boiled long enough. The lime-water in this formula is supposed to assist in dissolving the active matter of the root. The dose of the infusion is five or six ounces twice or thrice a-day.

INFUSUM VALERIANÆ. Infusion of Valerian. Dub.

"Take of the Root of Valerian, in coarse powder, two drachms; Boiling Water, seven ounces. Digest for an hour, and strain the liquor when it is cold."

VALERIAN is frequently taken in hysteric affections under the form of infusion, and this affords a preparation of proper strength. Its dose is from one to two ounces.

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# CHAP. VIII.

## OF MUCILAGES.

THE term Mucilage, in Pharmacy, is applied to solutions of gummy matter in water, sufficiently concentrated to have a degree of viscidity; or to similar solutions obtained by the maceration in water of vegetables, in which this kind of matter abounds. They are principally employed as vehicles for other substances, either to suspend powders in liquids, to diffuse oils or resinous matter in water, or to give form and tenacity to pills.

MUCILAGO ACACIÆ ARABICÆ. Mucilage of Gum-Arabic. Ed.

"Take of Gum-Arabic, one part; Boiling Water, two parts. Digest with frequent agitation until the gum be dissolved, then press the mucilage through linen."

MUCILAGO ACACIÆ. Mucilage of Gum-Arabic. Lond.

"Take of Gum-Arabic in powder, four ounces; Boiling Water, half a pint. Rub the gum with the water, gradually added, until it form a mucilage."

MUCILAGO GUMMI ARABICÆ. Mucilage of Gum-Arabic. Dub.

"Take of Gum-Arabic in coarse powder, four ounces; Hot Water, by measure, four ounces. Digest them, agitating frequently so as to dissolve the gum; then strain through linen."

MUCILAGE of gum-arabic is sometimes employed as the basis of the common demulcent mixtures used in catarrh. It is more generally used as an agent in Pharmacy, to suspend in water substances insoluble in that liquid, to diffuse oils in water, and for similar purposes. The mucilage of the Dublin College is twice as strong as the others, and may be used to suspend heavy powders in, and can be easily diluted if required. Dr. Duncan recommends a method of preparing mucilage better than the foregoing: it is to tie up the gum in a muslin rag, which is suspended in water; the gum is gradually abstracted by the water and a clear mucilage is formed, whereas in the common way it is turbid.

Mucilago amyli. Starch Mucilage. Ed.

"Take of Starch, three drachms; Water, one pound. Rub the starch with the water gradually added to it, then boil them for a short time."

Mucilago amyli. Lond. Dub.

"Take of Starch, three drachms, (six drachms, Dub.); Water, a pint. Rub the starch with the water gradually dropt upon it, then boil until it form a mucilage."

Starch, though insoluble in cold water, is dissolved by boiling water, and forms a gelatinous solution. The starch-mucilage is used as a vehicle for giving opium under the form of enema, in diarrhœas arising from acrimony in the intestines.

Mucilago astragali tragacanthæ. Mucilage of Gum Tragacanth. Ed. Dub.

"Take of Gum Tragacanth, two drachms; Boiling Water, (Cold Water, Dub.) eight ounces. Macerate for twenty-four hours, and rub carefully, that it may be dissolved; then strain through linen."

Tragacanth is not easily dissolved in water, and, even with the aid of heat, the viscid mucilaginous liquor that is formed remains turbid and flocculent: it is better to avoid the application of heat; to assist the solution the gum may be first beaten into a paste with a little water, and then the rest of the water added to it gradually. The proportion of the gum to the water is rather large in the formula, but is designed to form a stiff mucilage, to be used principally in making troches.

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# CHAP. IX.

## OF DECOCTIONS.

The power of water as a solvent is, like that of all other chemical agents, increased by heat. Hence, in general, the active matter of vegetable substances is extracted more completely by boiling them with water than by mere infusion, either cold or warm, the residuum in the one case being found more inert than in the other.

It is not to be concluded, however, from this fact, that the decoction is proportionally more powerful in medicinal operation. On the contrary, though the active matter of the substance is dissolved, it is often much injured in the operation: In few cases is the decoction equal in power to the quantity of the substance from which it is prepared; in many it is much impaired; and in some it is totally lost, the decoction itself and the residual matter being both nearly inert.

This change is often owing to the dissipation of the volatile principles of the substance operated on. All the essential oils are vo-

latilized at the temperature of boiling water. It is evident, therefore, that substances, whose virtues depend wholly or in part on their essential oil, must be injured by this operation : for this reason, aromatics are always useless additions to decoctions ; and the aromatic flavour of many active substances is also lost in this form of preparation.

It frequently also arises from the active principles of the vegetables employed being decomposed by the heat applied. Thus the decoctions of opium, cinchona, and ipecacuan, though not deriving their virtues from volatile ingredients, exhibit very little of the powers of these substances, a fact which can only be explained, by supposing their principles to have been partially or wholly decomposed by the operation. In some cases also, the active matter which is dissolved by the hot water is deposited when it becomes cold.

From these observations, it is evident that decoction can seldom be a proper form for the administration of medicines. The pungency and aromatic flavour, on which part of their virtues depend, and which render them at least more grateful, must always be impaired or lost, and their more important virtues must often be injured.

Most of the metallic salts are decomposed by the tannin, extractive, and other principles present in decoctions. Though they are thus chemically incompatible, it does not, however, as has been remarked, follow, that they must be medicinally incompatible, as the different ingredients, though separated, may retain their peculiar powers, which may be increased or beneficially modified by their conjunction.

Decoctions, like infusions, are extemporaneous prescriptions. They cannot be kept ready prepared, as in a few days they become turbid, and run into the acetous fermentation. They can be prepared, however, sooner than infusions ; the boiling not requiring to be continued in general for more than ten or fifteen minutes. While the boiling continues, the air ought to be excluded by covering the vessel ; and it ought not to be continued long. The method therefore often followed, of boiling down a considerable quantity of water on a vegetable, is generally improper. The liquor ought to be strained while hot, as, on cooling, a portion of the dissolved matter is frequently deposited, which is as active as that which remains dissolved, and this precipitate ought to be mingled with the liquid by agitation, when the dose is to be taken.

In compound decoctions, it is found convenient to throw in the ingredients in succession, beginning with the hardest and most insoluble, so that they shall be exposed longest to the action of the hot liquid.

Decoctum althææ officinalis. Decoction of Marsh-mallow. Ed. Dub.

"Take of Dried Althæa Root (and Herb, Dub.) bruised, four ounces ; Raisins, freed from their seeds, two ounces ; Water, seven pounds. Boil to five pounds ; put aside the strained liquor until the impurities have subsided, and pour off the clear liquor."

The gummy part of vegetables is less injured by decoction than any other. In this decoction, therefore, the mucilage which abounds in the althæa root is extracted unchanged, and the liquor is concentrated by the evaporation; the raisins are added to render the taste more pleasant. It is under this form that it is used as a demulcent, the decoction being taken to the extent of two or three pounds in the day, in nephritic complaints, in ardor urinæ, and sometimes in catarrh.

Decoctum anthemidis nobilis. Decoction of Chamomile. Ed.

"Take of the Dried Flowers of Chamomile, one ounce; Caraway Seeds bruised, half an ounce; Water, five pounds. Boil for a quarter of an hour, and strain."

Decoctum chamæmeli compositum. Compound Decoction of Chamomile. Dub.

"Take of Chamomile Flowers dried, half an ounce; Fennel Seeds, two drachms; Water, one pint. Boil a little, and strain."

This decoction is used as an enema, and as a fomentation. When applied to the former purpose, the effect is to be ascribed principally to the water; in the second, the vegetables are not more useful, except as retaining longer the heat and moisture when applied to a part, and rendering its application more convenient. The Cathartic and Fetid Clysters of the Dublin Pharmacopœia have this decoction for their basis.

Decoctum cinchonæ lancifoliæ. Decoction of Peruvian Bark. Ed.

"Take of Lance-leaved Bark bruised, one ounce; Water, one pound and a half. Boil for ten minutes in a covered vessel, and strain the liquor while hot."

Decoctum cinchonæ. Decoction of Peruvian Bark. Lond. Dub.

"Take of Lance-leaved Cinchona Bark bruised, an ounce; Water, a pint, (a sufficient quantity to afford a pint after straining, Dub.) Boil for ten minutes in a vessel lightly closed, and strain the liquor while warm."

The active principles of bark appear to be decomposed by continued heat; hence the reason of the direction given in the Pharmacopœia, that the boiling be not continued longer than ten minutes. The decoction is performed in a covered vessel, to exclude as much as possible the access of the air, to the chemical agency of which the change in the extractive matter is supposed to be owing. The liquor is ordered to be strained while hot, as it holds dissolved a larger portion of the active matter than it can retain in solution when cold. Hence, after having been strained, it becomes turbid as it cools, depositing a reddish precipitate, which possessing considerable energy, ought to be mixed with it by agitation when the dose is to be taken. The addition of a little sulphuric acid causes it to remain dissolved; and where this can be prescribed with propriety, it may be employed. The precipitate, according to Pelletier, consists chiefly of tannin and starch, which unfortunately carry down with them a part of the cinchonia. Caventou states, that if the

quantity of water be increased, almost all of the cinchonia will be held in solution, and the weak decoction thus prepared may be then filtered and concentrated by evaporation with a gentle heat.

Decoction of bark is used in those cases which require the free administration of the remedy, but in which, in substance, it sits uneasy on the stomach. The dose is two or three ounces, taken as often as the stomach will receive it.

Decoctum daphnes mezerei. Decoction of Mezereon. Ed. Dub.

"Take of the Bark of the Root of Mezereon, two drachms; of Liquorice Root bruised, half an ounce; Water, three pounds. Boil with a gentle heat to two pounds, and strain."

A compound decoction, prepared from guaiac wood, sarsaparilla, sassafras, mezereon, and liquorice, had been highly celebrated, under the name of Lisbon Diet Drink, for its efficacy in the treatment of symptoms connected with syphilis, particularly thickening of the ligaments, affections of the bones and periosteum, and obstinate ulceration. Dr. Russell, from a series of experiments, concluded, that the mezereon is the ingredient on which its activity depends; and this decoction, in which the liquorice serves to cover the pungency of the mezereon, has been substituted for the more complicated composition. It is used in the same cases; sometimes also in cutaneous affections, particularly lepra, and in chronic rheumatism. According to Mr. Pearson's experience of it, it has little efficacy in removing the syphilitic symptoms for which it is usually prescribed. Its dose is from four to six ounces twice or thrice a-day.

Decoctum geoffrææ inermis. Decoction of Cabbage-Tree Bark. Ed.

"Take of Cabbage-Tree Bark in powder, one ounce; Water, two pounds. Boil with a gentle heat to one pound, and strain."

Decoctum geoffroyæ. Decoction of Cabbage-Tree. Dub.

"Take of the Bark of the Cabbage-Tree bruised, an ounce; Water, two pints. Boil down to a pint, and to the strained liquor, add Syrup of Orange-Peel, two ounces."

This decoction is the form under which this medicine has been usually administered, the bark in substance being too violent in its operation. In the West India islands the decoction has been used as a very effectual remedy in worms, especially the lumbrici. The dose given is two ounces to an adult; if this occasion nausea, griping, or tenesmus, which it sometimes does, especially, it is affirmed, if cold water is drunk freely during its operation, these symptoms are relieved by a dose of castor oil. In this country it has not been much employed.

Decoctum guajaci compositum. Compound Decoction of Guaiac. Ed.

"Take of Guaiac Wood Shavings, three ounces; Raisins, two ounces; Sassafras Root cut, Liquorice Root bruised, of each one ounce; Water, ten pounds. Boil the water with the guaiac wood

and raisins, on a gentle fire, to five pounds, adding the roots towards the end of the boiling, then strain."

DECOCTUM GUAIACI COMPOSITUM. Compound Decoction of Guaiac. Dub.

"Take of Guaiac Wood scraped, three ounces; Sassafras Root sliced, ten drachms; Liquorice Root bruised, two ounces and a half; Water, ten pints. Boil the guaiac wood in the water down to one half, and towards the end of the boiling, add the liquorice and sassafras, and strain the liquor."

THIS decoction derives its virtues principally from the guaiac. It acts as a diaphoretic, and has been used in cutaneous diseases, and in chronic rheumatism, taken in the quantity of a pound twice or thrice a-day. It has also been employed in the treatment of obstinate venereal symptoms, especially as an auxiliary to mercury.

DECOCTUM HORDEI. Decoction of Barley. Ed. Dub.

"Take of Pearl Barley, two ounces; Boiling Water, five pounds. First wash off with cold water the flour adhering to the barley; then boil the barley for a short time with about half a pound of water, to extract the colouring matter. This being rejected, put the barley thus purified into five pounds of boiling water. Boil this to one-half, and strain."

DECOCTUM HORDEI. Decoction of Barley. Lond.

"Take of the Seeds of Barley, two ounces; Water, four pints and a half. First wash off the impurities adhering to the barley in cold water, then pouring on half a pint of water, boil the seeds a little; this water being rejected, pour on the remaining water previously heated; then boil down to two pints, and strain."

THIS decoction is never prepared in the shops. It is, however, very extensively used as a diluent in febrile diseases; and as it is of some importance that it should be grateful, it has been judged proper to give directions how it may be best prepared.

DECOCTUM HORDEI COMPOSITUM. Compound Decoction of Barley. Dub. Lond.

"Take of Decoction of Barley, four pints; (two pints, and Water, one pint, Lond.); Raisins freed from the seeds, Figs cut, of each two ounces; Liquorice cut and bruised, half an ounce. During the boiling, add first the raisins, then the figs, and lastly the liquorice, a little before the end of the boiling, which will be complete when about two pints of the liquor remain."

THE additions in these compound decoctions can communicate little efficacy, and perhaps render the liquor rather cloying to the taste and stomach.

DECOCTUM LICHENIS ISLANDICI. Decoction of Iceland Liverwort. Ed. Lond.

"Take of Iceland Liverwort, an ounce; Water, two pounds, (a pint and a half, Lond.) Boil down to sixteen ounces, and strain."

DECOCTUM LICHENIS ISLANDICI. Decoction of Iceland Liverwort. Dub.

"Take of Iceland Liverwort, half an ounce; Boiling Water, a

pint. Digest for two hours in a close vessel; boil for a quarter of an hour, and strain the liquor while warm."

The fecula or mucilage of the lichen is extracted by water by boiling, and it is under this form of decoction that it has been employed as a demulcent, and a mild nutritious substance easy of digestion. It may be rendered more grateful by removing the bitter matter of the lichen by previous maceration. Some, however, consider the bitter matter useful, as exerting a tonic action.

Decoctum polygalæ senegæ. Decoction of Seneka. Ed.

"Take of Seneka Root, one ounce; Water, two pounds. Boil to sixteen ounces, and strain."

Decoctum senegæ. Decoction of Senega. Lond.

"Take of Senega Root, an ounce; Water, two pints. Boil down to a pint, and strain."

Decoctum senegæ. Decoction of Seneka. Dub.

"Take of Seneka root, three drachms; Water, a pint and a half. Boil down to eight ounces, and strain."

Under the form of decoction senega has been employed as an expectorant in pneumonic affections, attended with accumulation of mucus in the bronchiæ, and as a diaphoretic in chronic rheumatism, and in arthritic complaints. The dose is two or three ounces three or four times a-day.

Decoctum quercus roboris. Decoction of Oak Bark. Ed.

"Take of Oak Bark bruised, an ounce; Water, two pounds and a half. Boil down to sixteen ounces, and strain."

Decoctum quercus. Decoction of Oak Bark. Lond. Dub.

"Take of Oak Bark, an ounce; Water, two pints. Boil down to a pint, and strain."

The astringency of the oak bark is extracted by boiling in water; and the decoction is the form under which it is used locally as a styptic in hæmorrhoids, prolapsus ani, leucorrhœa, and profuse menorrhagia.

Decoctum smilacis sarsaparillæ. Decoction of Sarsaparilla. Ed.

"Take of Sarsaparilla Root cut, six ounces; Water, eight pounds. Digest for two hours in a temperature of about 195°, then take out the root and bruise it; put it again into the liquor, and boil it with a gentle fire to four pounds; then express it, and strain."

Decoctum sarsaparillæ. Decoction of Sarsaparilla. Lond. Dub.

"Take of Sarsaparilla Root sliced, (and cleansed with cold water, Dub.) four ounces; Boiling Water, four pints. Macerate for four hours in a vessel lightly closed nigh the fire, then cut and bruise the sarsaparilla; return it bruised into the liquor, and again macerate in a similar manner for two hours; lastly, boil to two pints, and strain."

There is a difference of opinion as to the degree of boiling necessary to extract the active matter of sarsaparilla. According to Dr. Paris, the decoction is seldom boiled long enough, while Dr. A. T. Thomson affirms that long boiling injures the power of the sarsa-

parilla, and that mere maceration in warm water is preferable. The latter opinion is more generally held, and the above formula regarded as unnecessarily complicated. Mr. Brande says, that if the root be well bruised and beaten, and the decoction simmered down and squeezed out of the root after the evaporation, the extraction of soluble matter will be completed in less than half the time. This decoction is the form under which sarsaparilla is always given, its dose being from a pint to a quart in the course of the day. It has been used in venereal cases, either to promote the action of mercury, or to remove symptoms which have remained after a long continued mercurial course. Dr. Fordyce celebrated its efficacy in very high terms in giving relief in nocturnal pains, removing eruptions, and as being the best restorative in the emaciation and debility remaining after the long continued use of mercury. According to Mr. Pearson also, though sarsaparilla is in no respect an antidote to syphilis, it is extremely beneficial in what may be called syphiloid diseases. The decoction has been used with considerable advantage as a demulcent in dysuria, and in morbid irritability of the bladder, occasioning incontinence of urine. It has of late also been employed in the treatment of foul ulcers, and in some forms of scrofula.

Decoctum ulmi campestris. Decoction of Elm. Ed.

"Take of the Fresh Bark of the Elm bruised, four ounces; of Water, five pounds. Boil down to two pounds and a half, and then strain."

Decoctum ulmi. Decoction of Elm. Lond. Dub.

"Take of the fresh Bark of the Elm bruised, four ounces; Water, four pints. Boil down to two pints, and strain."

This decoction has been highly praised by some practitioners in certain cutaneous diseases, but is now regarded as quite inactive. The dose is six ounces, taken twice or thrice a-day.

A few decoctions, peculiar to the London and Dublin Pharmacopœias, remain to be noticed.

Decoctum aloes compositum. Compound Decoction of Aloes.—Lond. Dub.

"Take of Extract of Liquorice, half an ounce; Sub-carbonate of Potash, two scruples; Extract of Aloes, (Hepatic, Dub.) Myrrh in powder, Saffron, of each one drachm; Water, a pint; Compound Tincture of Cardamoms, four fluid-ounces. Boil down the liquorice, the sub-carbonate of potash, the aloes, myrrh, and saffron, with the water, to twelve fluid-ounces, and strain; then add the Compound Tincture of Cardamoms."

The gum-resinous substances in this decoction are retained in solution, partly by the solvent power of the water, and partly by the action of the alkali; and by the addition of the spiritous tincture, any spontaneous decomposition will be more effectually prevented. The composition is analogous to one formerly in use, the celebrated Baume de Vie. It is one which, it might be supposed, must be very nauseous, but it is said not to be ungrateful, and to form a good

stimulating aperient. It is given in the dose of two ounces. The original Baume de Vie appears to have contained no alkali.

DECOCTUM CYDONIÆ. Decoction of Quince Seeds. Lond.

"Take of Quince Seeds, two drachms; Water, a pint. Boil with a gentle heat for ten minutes, then strain."

QUINCE seeds abound with mucilage, which is extracted by boiling in water. It is liable to spontaneous decomposition, and having no peculiar advantage, is little used. It has the disadvantage, also, of being coagulated by acids. It has been recommended as an application to erysipelatous surfaces.

DECOCTUM DULCAMARÆ. Decoction of Woody Nightshade. Lond. Dub.

"Take of the Stalks of Woody Nightshade cut, one ounce; Water, a pint and a half. Boil down to a pint, and strain."

IN this decoction a small portion of solania exists, which is supposed to communicate diuretic and narcotic powers; but these are inconsiderable. It is used chiefly as a diet drink, and is said to increase all the secretions and excretions. Two or three ounces of it may be taken twice or thrice a-day, and its quantity may be, in time, increased to a pint daily.

DECOCTUM GLYCYRRHIZÆ. Decoction of Liquorice. Dub.

"Take of Liquorice-root bruised, an ounce and a half; Water, a pint. Boil for ten minutes, and strain."

AN agreeable demulcent, and a good vehicle for remedies which have a nauseous taste.

DECOCTUM HÆMATOXYLI. Decoction of Logwood. Dub.

"Take of Logwood Shavings, an ounce and a half; Cinnamon Bark bruised, one drachm; Water, two pints. Boil the wood in the water, and evaporate to a pint; towards the end of the boiling add the cinnamon, and strain."

A weak astringent decoction, of use in cases of slight diarrhœa.

DECOCTUM MALVÆ COMPOSITUM. Compound Decoction of Mallow. Lond.

"Take of Mallow dried, an ounce; Chamomile Flowers dried, half an ounce; Water, a pint. Boil them for a quarter of an hour, and strain."

THIS is designed for the same purpose as the decoction of chamomile, that of serving as a vehicle for fomentations and enemas; and the same observation applies to it.

DECOCTUM PAPAVERIS. Decoction of Poppy. Lond. Dub.

"Take of the Capsules of the White Poppy cut, four ounces; Water, four (two, Dub.) pints. Boil for a quarter of an hour, and strain."

THE decoction of the capsules of the poppy is frequently used as an anodyne fomentation.

Decoctum pyrolæ. Decoction of Winter-Green. Dub.

"Take of Winter-Green, an ounce; Water, two pints. Macerate for six hours, then take out the winter-green, and having bruised it, return it to the liquor, and evaporate the mixture until there remain enough to afford a pint of decoction with expression."

This decoction is used as a diuretic in dropsy, particularly in ascites, and as a palliative in strangury, gravel and nephritis. Its dose is two or three ounces, given several times a-day.

Decoctum sarsaparillæ compositum. Compound Decoction of Sarsaparilla. Lond. Dub.

"Take of the Simple Decoction of Sarsaparilla boiling, four pints; Sassafras Wood cut,(and bruised, Dub.), Raspings of Guaiac Wood, Liquorice Root bruised, of each one ounce; Mezereon Root Bark, three drachms. Boil for a quarter of an hour, and strain."

This is nearly the same composition as the Lisbon Diet Drink, celebrated, as has been already remarked, in the treatment of secondary venereal affection, or symptoms appearing during a protracted mercurial course. The efficacy of the preparation has been supposed to depend principally on the mezereon; the other substances may, however, add something to its power, and it is perhaps preferable, as a general rule, to adhere to the original composition of remedies of this kind, the efficacy of which is in some measure specific, where it appears otherwise unexceptionable. Its chief action is as a diaphoretic; the dose is four or six ounces three times a-day.

Decoctum taraxaci. Decoction of Dandelion. Dub.

"Take of the fresh Herb and Root of Dandelion, four ounces; Water, two pints. Boil down to a pint, and strain the expressed liquor."

A mucilaginous decoction with slight bitterness, used as a diuretic, but more particularly for hepatic diseases, (see the Extract.)

Decoctum veratri. Decoction of White Hellebore. Lond. Dub.

"Take of White Hellebore Root beat, (powdered, Dub.) an ounce; Water, two pints; Rectified Spirit, two fluid-ounces. Boil the white hellebore root with the water down to a pint, and strain; when cold, add the spirit."

This decoction is employed as an external application in some cutaneous diseases, principally in psora. It is a much less unpleasant application than the sulphur ointment, and is occasionally successful. It must, however, be used with caution, as it is very acrid and stimulant, from containing dissolved a portion of *veratria*. To lessen its irritating quality, it is found useful sometimes to dilute it with an equal weight of water.

# CHAP. X.

## SYRUPI.—SYRUPS.

Syrups are saturated solutions of sugar in water, in watery infusions, or in vegetable juices. They are seldom active medicines; and are more commonly employed to render others agreeable, and in Pharmacy to communicate peculiar forms.

The proportion of sugar in syrups is generally two parts to one of the fluids; if it is more than this, the solution is disposed to crystallize; if less, it is liable to ferment, and become acescent. Refined sugar ought always to be employed. It is to be melted in the liquid by a gentle heat, and any impurities which collect on its surface when boiling are to be removed. The syrup ought to be kept in a cool place, to prevent the fermentation, which is favoured by a high temperature. The London College order them to be kept at a temperature not higher than 50° Fahr. The Dublin College give the general formula with regard to the preparation of all the syrups which they prescribe, that "twenty-nine ounces of refined sugar in powder, and a pint of the prescribed liquor, are to be digested with a moderate heat in a close vessel, stirring frequently, until the sugar, which must be gradually added, is dissolved; the liquor is to be put aside for twenty-four hours, the scum removed, and the syrup poured off from any impurities."

The fermentation of syrups, according to Dr. Macculloch, may be prevented, by adding to them a small quantity of sulphate or chlorate of potash, and without any change in the taste. M. Chereau found that the addition of a small portion of sugar of milk (one part of it to thirty of syrup) has the same effect.

Syrupus aceti. Syrup of Vinegar. Ed.

"Take of Vinegar, five parts; Refined Sugar, seven parts. Boil so as to form a syrup."

This is a very simple syrup, a little acidulated, and may be given mixed with barley-water, or demulcents of that nature, in febrile or inflammatory diseases. As it is sufficiently pleasant as an acid, it may be mixed with all those medicines in which the acid does not effect any chemical change.

Syrupus althææ officinalis. Syrup of Althæa. Ed.

"Take of fresh Althæa Root cut, one part; Water, ten parts; Refined Sugar, four parts. Boil the water with the root to one-half, and expressing it strongly, strain. Put aside the strained liquor, that the impurities may subside, and to the purified liquor add the sugar. Boil it so as to form a syrup."

Syrupus althææ. Syrup of Marshmallow. Lond. Dub.

"Take of fresh Althæa Root bruised, half a pound; Refined Sugar, two pounds; Water, four pints. Boil down the water with the root to one-half, and express the cold liquor. Put it aside for twen-

ty-four hours, that the impurities may subside; then pour off the liquor, and having added the sugar, boil down to a proper consistence."

The water dissolving the mucilage of the althæa, less than the usual proportion of sugar is required to give it the consistence of a syrup. This mucilage is supposed to give the syrup some demulcent power; but this must be very trivial, and it renders it more liable to spontaneous decomposition. It is used chiefly for sweetening emollient decoctions.

Syrupus amomi zingiberis. Syrup of Ginger. Ed.

"Take of the Root of Ginger powdered, six drachms; Boiling Water, one pound; Refined Sugar, twenty-two ounces. Macerate the root with the water, in a close vessel, for twenty-four hours, then add the sugar to the strained liquor, and dissolve by a gentle heat."

Syrupus zingiberis. Syrup of Ginger. Lond.

"Take of Ginger Root cut, two ounces; Boiling Water, a pint; Refined Sugar, two pounds. Macerate the ginger in the water for four hours, and strain; then add the sugar in the manner ordered with regard to simple syrup."

Syrupus zingiberis. Syrup of Ginger. Dub.

"Take of Ginger Root bruised, four ounces; Boiling Water, three pints. Macerate for twenty-four hours; then to the strained liquor add the sugar, and form a syrup."

The infusion is impregnated with the flavour and pungency of the ginger, which render it sufficiently grateful, and it affords a cheap aromatic syrup, that may be added to bitter infusions and griping purgatives. Dose, one drachm to four.

Syrupus cassiæ sennæ. Syrup of Senna. Ed.

"Take of Senna Leaves, two ounces; Boiling water, a pound and a half; Empyreumatic Syrup, (Molasses,) eight ounces. Macerate the leaves in the water, in a lightly covered vessel, for four hours, and strain; add the syrup, and boil with a gentle heat to the thickness of the empyreumatic syrup."

Syrupus sennæ. Syrup of Senna. Lond.

"Take of Senna Leaves, two ounces; Bruised Fennel Seeds, an ounce; Manna, three ounces; Refined Sugar, one pound; Boiling Water, one pint. Macerate the senna leaves and the fennel seeds in the water, with a gentle heat, for an hour; strain the liquor; mix with this the manna and sugar, and boil down to a proper consistence."

This is designed as a purgative syrup for children. The proportion of saccharine matter is too large, and renders the syrup thicker than honey, and the manna crystallizing, is in part separated. Molasses are uncrystallizable, and are not liable to this objection. The infusion of senna, sweetened with sugar or manna, which is in common use, being of extemporaneous preparation, is preferable to any of these syrups.

Syrupus citri aurantii. Syrup of Orange-Peel. Ed.

"Take of the fresh Outer Rind of the Orange, three ounces; Boiling Water, one pound and a half; Refined Sugar, three pounds,

Macerate the rind with the water for twelve hours in a closed vessel, then to the strained liquor add the sugar to be dissolved by a gentle heat."

Syrupus aurantiorum. Syrup of Orange-Peel. Lond.

"Take of the fresh Rind of the Orange, two ounces; Boiling Water, a pint; Refined Sugar, three pounds. Macerate the rind in the water for twelve hours, in a vessel lightly closed; then pour off the liquor, and add the sugar to it."

Syrupus aurantii. Syrup of Orange-Peel. Dub.

"Take of the fresh Rind of the Seville Orange, eight ounces; Boiling Water, six pints. Macerate for twelve hours in a closed vessel; then in the strained liquor dissolve refined sugar to form a syrup."

This syrup, like that of ginger, is used on account of its grateful aromatic flavour. The heat applied ought to be as gentle as possible, otherwise the flavour of the Orange-Peel will be lost.

Syrupus citri medicæ. Syrup of Lemon. Ed.

"Take of the Juice of Lemons strained, after the impurities have subsided, three parts; Refined Sugar, five parts; dissolve the sugar."

Syrupus limonum. Syrup of Lemons. Lond.

"Take of Lemon Juice strained, a pint; Refined Sugar, two pounds. Dissolve the sugar in the lemon juice in the manner ordered for preparing simple syrup."

Syrupus limonis. Syrup of Lemon. Dub.

"Take of Fresh Lemon Juice, two pints. When the impurities have subsided, put the juice into a matrass, and subject it for a quarter of an hour to the heat of boiling water. When cold pass it through a sieve, and make it into a syrup."

This is a pleasant syrup, used to sweeten and acidulate mixtures, especially those of the mucilaginous kind: there are others, as those containing alkalis and alkaline earths, into the composition of which it cannot properly enter, from the chemical agency of the acid. It is sometimes added to gargles.

Syrupus colchici autumnalis. Syrup of Colchicum. Ed.

"Take of the Fresh Root of Colchicum, cut into small pieces, one ounce; Vinegar, sixteen ounces; Refined Sugar, twenty-six ounces. Macerate the root in the acid for two days, shaking the vessel occasionally; then expressing it gently, strain it; to the strained liquor add the sugar, and boil a little, so as to form a syrup."

Colchicum has been used under this form as a diuretic in dropsy, the dose being from half an ounce to an ounce.

Syrupus dianthi caryophylli. Syrup of Clove July-Flower. Ed.

"Take of the Fresh Petals of the Clove July-Flower, freed from the heels, one part; Boiling Water, four parts; Refined Sugar, seven parts. Macerate the petals in the water for twelve hours;

then to the strained liquor add the sugar, which dissolve with a gentle heat."

This syrup derives from the flowers a rich red colour, and an agreeable flavour, and from these qualities is frequently used in mixtures. It is sometimes imitated by making a syrup with spice cloves and sugar, and colouring it with cochineal. The counterfeit may, as Dr. Duncan remarks, be easily detected, by adding to it a little of an alkali, which will change the colour of the real syrup at once to green, but will produce no alteration in the counterfeit.

Syrupus papaveris somniferi. Syrup of White Poppy. Ed.

"Take of the Dried Capsules of the White Poppy, freed from the seeds, one part; Boiling Water, fifteen parts; Refined Sugar, two parts. Macerate the capsules cut in the water for twelve hours; then boil until a third part of the liquor only remain; and pressing it strongly, strain; boil the strained liquor down to a half, and again strain; lastly, the sugar being added, boil so as to form a syrup."

Syrupus papaveris. Syrup of Poppy. Lond.

"Take of the Capsules of the Poppy, dried and bruised, the seeds being removed, fourteen ounces; Refined Sugar, two pounds; Boiling Water, two gallons and a half. Macerate the capsules in the water for twenty-four hours; then boil down the liquor in a water-bath to a gallon, and express it strongly: boil it again to two pints, and strain it while hot. Put it aside for twelve hours, that the impurities may subside; then boil down the clear liquor to a pint, and add the sugar as ordered for the preparation of simple syrup."

Syrupus papaveris somniferi. Syrup of White Poppy. Dub.

"Take of the Capsules of the White Poppy, dried and bruised, (the seeds being removed,) seventeen ounces; Boiling Water, two gallons. Macerate the capsules in the water for twenty-four hours, then boil down to one gallon in a water-bath, and strongly express the liquor. After straining boil down the liquor to two pounds, and filter it while it is hot; put it aside for twelve hours, that the impurities may subside; then boil down the clear liquor to a pint, and make into a syrup."

The active matter of the capsule of the poppy is extracted by water by decoction, and, by boiling down the liquor, is obtained in a more concentrated state. The syrup has a considerable degree of narcotic power; and the taste being agreoable, and the dose easily regulated, it is more convenient than any preparation of opium for exhibition to children; one ounce of it is supposed to be equal to one grain of opium. The medium dose is a drachm to a child a year old; to an adult it may be half an ounce or an ounce. Being intended for infants, it is of considerable importance that it should be always of nearly the same strength; this can be attained only by following the formulas: the use of a water-bath, however, as directed in the London Pharmacopœia, is, as Mr. Phillips remarks, unnecessary, for the agitation of boiling keeps the capsules from the bottom of the boiler, and prevents their being burnt. Accidents sometimes happen from its being given in too large quantity or too strong

to infants; and perhaps it would be better, as Mr. Brande remarks, if opium were not given in any form to children unless under proper medical inspection, when the tincture might be used.

Syrupus rosæ centifoliæ. Syrup of Hundred-leaved Rose. Ed.

"Take of the Fresh Petals of the Pale Rose, one part; Boiling Water, four parts; Refined Sugar, three parts. Macerate the petals in water for twelve hours; then to the strained liquor add the sugar, and boil, so as to form a syrup."

Syrupus rosæ. Syrup of Rose. Lond. Dub.

"Take of the Dried Petals of the Pale Rose, seven ounces; Refined Sugar, six pounds; Boiling Water, four pints. Macerate the petals of the rose in water for twelve hours, and strain. Evaporate the strained liquor by a water-bath to two pints and a half; then add the sugar as ordered for the preparation of simple syrup."

The agreeable flavour of the rose is lost in this syrup; but it has a weak purgative power, and is sometimes given to infants in a dose of two or three tea-spoonfuls. The red colour becomes brighter when acids are used with it, and is rendered yellow or green by alkalis."

Syrupus rosæ gallicæ. Syrup of Red Rose. Ed.

"Take of the Dried Petals of the Red Rose, one part; Boiling Water, nine parts; Refined Sugar, ten parts. Macerate the petals in water for twelve hours; then boil them a little, and strain; to the strained liquor add the sugar and again boil, so as to form a syrup."

Water, by infusion, extracts the slight astringency and the colour of the red rose; the astringency has been supposed to be such as to counteract the laxative quality of the sugar, and hence it is usually this syrup that enters into the composition of astringent mixtures.

Syrupus scillæ maritimæ. Syrup of Squill. Ed.

"Take of the Vinegar of Squill, four parts; Refined Sugar in powder, seven parts. Dissolve the sugar with a gentle heat, so as to form a syrup."

This is a syrup of considerable power, the active matter of squill being dissolved by vinegar without much change, and being little injured in forming it into a syrup. It is a form under which squill is often prescribed as an expectorant; it is given in a dose of one drachm, repeated every third or fourth hour, and is often added to combinations of expectorant remedies.

Syrupus simplex. Simple Syrup. Ed.

"Take of Refined Sugar, fifteen parts; Water, eight parts. Dissolve the sugar with a gentle heat, and boil a little so as to form a syrup."

Syrupus simplex. Simple Syrup. Lond.

"Take of Refined Sugar, two pounds and a half; Water, a pint. Dissolve the sugar in the water in a water-bath: put aside for twen-

ty-four hours; then remove the scum; and pour off the clear liquor from any impurities."

SYRUPUS SIMPLEX. Simple Syrup. Dub.

"Take of Refined Sugar, in fine powder, twenty-nine ounces; Water, a pint. Add the sugar gradually to the water, and digest in a close vessel with a moderate heat, frequently shaking until it be dissolved; afterwards pour it off from the dregs, if there be any."

THIS solution of sugar is used merely to communicate sweetness of taste, or for the pharmaceutical purposes to which syrups are applied. It should be clear and nearly colourless.

SYRUPUS TOLUIFERÆ BALSAMI. Syrup of Tolu Balsam. Ed. Dub.

"Take of Common Syrup, two pounds, (a pound and a half, Dub.); Tincture of Tolu Balsam, one ounce. With the syrup newly prepared, and removed from the fire, when it has nearly cooled, mix the tincture gradually, continually stirring it."

SYRUPUS TOLUTANUS. Tolu Syrup. Lond.

"Take of Balsam of Tolu, one ounce; Boiling Water, a pint; Refined Sugar, two pounds. Boil the balsam in the water for half an hour in a close vessel, stirring frequently, and strain the liquor when cold, then add the sugar as directed for preparing simple syrup."

THE formula of the Edinburgh Pharmacopœia gives an economical mode of preparing this syrup; but the old method retained in the London Pharmacopœia affords a more grateful composition, the syrup being impregnated with the odour and benzoic acid of the balsam, without its resinous matter being diffused through it, which, as prepared by the other mode, renders it white and turbid. The syrup is used merely on account of its flavour, and to many this is rather disagreeable. On the supposition of tolu balsam being an expectorant, it sometimes enters into the composition of mixtures used in catarrh.

SYRUPUS VIOLÆ ODORATÆ. Syrup of Violet. Ed.

"Take of the fresh flowers of the Sweet Scented Violet, two parts; Boiling Water, eight parts; Refined Sugar, fifteen parts. Macerate the flowers in water for twenty-four hours in a covered glass or earthen vessel; then strain without expression, and to the strained liquor add the sugar so as to form a syrup."

SYRUPUS VIOLÆ. Syrup of Violet. Dub.

"Take of the Fresh Petals of the Violet, two pounds; Boiling Water, five pints, Macerate for twenty-four hours, then strain the liquor through fine linen without expression, add, lastly, sugar so as to form a syrup."

THIS syrup has a fine blue colour, and this is rendered still brighter if it be prepared in pewter vessels, a circumstance for which a reason has not been assigned. The syrup is a very gentle laxative, probably from a small quantity of emetia, which, according to Pelletier and Majendie, it contains, or, as M. Boullay has stated, a principle exceedingly similar, which he has named *Violin*; as such

it is given to infants, in a dose of one or two tea-spoonfuls. Acids change its colour to red, and alkalis to green; hence it is sometimes used to give these colours to acidulated or alkaline mixtures. It loses its colour on keeping.

It remains to notice those few syrups which have exclusively a place in the London or Dublin Pharmacopœias.

Syrupus croci. Syrup of Saffron. Lond.

"Take of Saffron, an ounce; Boiling Water, a pint; Refined Sugar, two pounds and a half. Macerate the saffron in the water for twelve hours, in a vessel lightly closed; then strain the liquor, and add the sugar to it."

This syrup is employed in mixtures merely on account of its fine colour. It is often necessary to vary the appearance of medicines, whose use requires to be persevered in for some time before advantage is obtained from them, as the repetition of the same remedy becomes at last nauseous to the patient. A number of preparations to communicate colour are hence used, by which the aspect of a medicine may be changed, without alteration of its powers.

Syrupus mori. Syrup of Mulberry. Lond.

"Take of Mulberry Juice strained, a pint; Refined Sugar, two pounds. Dissolve the sugar in the juice in the manner directed with regard to simple syrup."

The syrups of several acidulous fruits had formerly a place in the London Pharmacopœia. This is retained as one of the most grateful, and is often employed in cooling draughts.

Syrupus rhamni. Syrup of Buckthorn. Lond.

"Take of the Fresh Juice of Buckthorn Berries, four pints; Ginger Root cut, Pimento Berries bruised, of each half an ounce; Refined Sugar, three pounds and a half. Put aside the juice for three days, that the impurities may subside, and strain. To a pint of the purified juice add the ginger and pimento; macerate with a gentle heat for four hours, and strain. Boil down the remaining quantity to a pint and a half, mix the liquids, then add the sugar, as ordered for preparing simple syrup."

Syrupus rhamni. Syrup of Buckthorn. Dub.

"Take of the Fresh Juice of Buckthorn, two pints and a half; Ginger Root sliced, Pimento Berries bruised, of each three drachms. Set aside the juice that the dregs may subside, and strain; add to ten ounces of the purified juice the ginger and pimento. Macerate for twenty-four hours, and strain. Boil down the remainder of the liquor to a pint, and form a syrup."

The juice of the buckthorn is best preserved by being made into a syrup, and it is under this form that it has been used as a cathartic, the dose to an adult being an ounce or an ounce and a half. Its operation, however, is unpleasant, causing thirst and dryness of the mouth, and sometimes severe griping, and the preparation has no-

thing to recommend it. Draughts of warm liquids render its operation milder.

Syrupus rhœados. Syrup of Red Poppy. Lond.

"Take of the Recent Petals of the Red Poppy, one pound; Boiling Water, a pint and two fluid-ounces; Refined Sugar, two pounds and a half. To the water heated by a water-bath, add the petals of the red poppy gradually, stirring them occasionally; then having removed the vessel, macerate for twelve hours; press out the liquor, and put it aside, that the impurities may subside; lastly, add the sugar in the manner directed with regard to simple syrup."

Syrupus papaveris rhœadis. Syrup of Red Poppy. Dub.

"Take of the Fresh Petals of Red Poppy, a pound; Boiling Water, twenty ounces by measure. Add the petals gradually to the boiling water; then removing the vessel from the fire, macerate with a lower heat for twelve hours; express the liquor, and put it aside that the impurities may subside; lastly, add refined sugar and form a syrup."

The Papaver Rhœas is the common Red Poppy of this country. The petals are put into the water boiling, that they may shrink and be received into the vessel: as soon as this is effected the vessel must be removed from the fire. The syrup is valued only on account of its fine red colour.

Syrupus sarsaparillæ. Syrup of Sarsaparilla. Lond. Dub.

"Take of Sarsaparilla Root cut, a pound; Boiling Water, a gallon; Refined Sugar, a pound. Macerate the root in the water for twenty-four hours; then boil down to four pints, and strain the liquor whilst hot; then add the sugar, and evaporate to a proper thickness."

According to Mr. Brande, this decoction of Sarsaparilla, made into a syrup, has been of late much prescribed, and has hence been introduced into the last London Pharmacopœia. It is not liable to ferment, but the sugar is apt sometimes to disagree with the stomach: it is improved by the addition of a few cloves. It is given as an alterative in a dose of two tea-spoonfuls, thrice a-day. Mr. Phillips states, that it is employed as an adjunct to the decoction of Sarsaparilla.

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## CHAP. XI.

### MELLITA—MEDICATED HONEYS.

Honey has been employed instead of saccharine matter in some pharmaceutical preparations. Combined with vinegar, either alone or with the impregnation of the active matter of vegetables, the kind of composition named Oxymel is formed. Combined merely with infusions of vegetable substances, it forms what are more exclusively

named Medicated Honeys. As the extraneous matter in honey causes it to disagree with some stomachs, syrups are now frequently substituted for these preparations.

Mel despumatum. Clarified Honey. Ed. Lond. Dub.

"Liquefy Honey in a water-bath, and remove the scum as it rises."

Honey, as it is expressed from the comb, is liable to contain wax and other impurities. When the honey is liquefied, these in a great measure separate and rise to the surface, so as to be easily removed. The honey thus purified is not so agreeable to the smell and taste as crude honey; but it does not ferment so easily, and is less liable to gripe. By means of charcoal and chalk, it may be rendered a pure syrup, and this is done in French pharmacy; but there is no advantage in this, for it is easier and cheaper to prepare syrup with sugar.

Mel rosæ gallicæ. Honey of Red Roses. Ed.

"Take of Red Rose Leaves dried, one ounce; Boiling Water, one pound; Clarified Honey, sixteen ounces. Macerate the petals in the water for six hours; then strain, add the honey, and finally boil down to a proper thickness."

Mel rosæ. Honey of Rose. Lond. Dub.

"Take of the Dried Petals of the Red Rose, four ounces; Boiling Water, three pints; Clarified Honey, (unclarified, Dub.) five pounds. Macerate the petals in the water for six hours, then to the strained liquor add the honey, and boil it down in a water-bath to the proper consistence."

This preparation is similar to the syrup of the red rose, and may be applied to the same purposes. It is frequently added to astringent gargles. The Dublin College use unclarified honey, but there is a risk of the impurities injuring the colour and astringency.

Mel sub-boratis sodæ. Honey of Borax. Ed. Lond.

"Take of Sub-borate of Soda in powder, one part; Clarified Honey, eight parts. Mix them."

Mel boracis. Honey of Borax. Lond. Dub.

"Take of Sub-borate of Soda in powder, a drachm; Clarified Honey, an ounce. Mix them."

In this composition honey is useful, as giving the proper consistence. It is an useful application in aphthous affections of the tongue and fauces, the borax giving a sense of coolness, and removing the foul crust.

Oxymel. Oxymel. Ed.

"Take of Clarified Honey, three parts; weak Acetic Acid, two parts. Boil down, in a glass vessel, on a slow fire, to a proper thickness."

Oxymel simplex. Simple Oxymel. Lond.

"Take of Purified Honey, two pounds; Diluted Acetic Acid, a pint. Boil them down, in a glass vessel, on a slow fire, to the proper consistence."

OXYMEL. Oxymel. Dub.

"Take of Honey, two pounds; Distilled Vinegar, a pint. Boil in a glass vessel, with a gentle heat, to the thickness of syrup, removing the scum."

THIS has long been in use as a remedy in catarrhal affections, and is also the basis of a cooling detergent gargle. Mr. Brande regards the formula as objectionable, from the long evaporation which is required to bring the oxymel to a proper consistence. He recommends as a preferable process, to mix two pounds of clarified honey with two ounces of strong Acetic Acid, and two ounces of water, in a vessel surrounded with boiling water.

OXYMEL SCILLÆ. Oxymel of Squill. Lond. Dub.

"Take of Clarified Honey, three pounds; Vinegar of Squill, two pints. Boil down in a glass vessel, over a slow fire, to the consistence of a syrup."

UNDER this form squill has been employed principally as an expectorant in chronic coughs and humoral asthmas. Its dose is one or two drachms, given in some aromatic water, as that of cinnamon. In large doses it is emetic.

OXYMEL COLCHICI. Oxymel of Meadow Saffron. Dub.

"Take of the Fresh Root of Colchicum cut into thin slices, one ounce; Distilled Vinegar, one pint; Clarified Honey, by weight, two pounds. Macerate the colchicum with the vinegar for two days in a glass vessel; then strain the liquor pressed out strongly from the root, and add the honey. Lastly, boil the mixture, stirring it frequently with a wooden spoon, to the consistence of a syrup."

THIS is essentially the same with the syrup of colchicum already noticed; nor can it derive any advantage from honey being used in its preparation. It is an active preparation, but uncertain in its strength, from the veratria being in part decomposed by the boiling.

OXYMEL CUPRI SUB-ACETATIS. Oxymel of Verdigris. Dub.
LINIMENTUM ÆRUGINIS. Liniment of Verdigris. Lond.

"Take of Prepared Verdigris, one ounce; Vinegar, seven ounces by measure; Clarified Honey, fourteen ounces by weight. Dissolve the verdigris in the vinegar, and strain through linen, then add the honey, and boil down to a proper thickness."

UNDER this form verdigris is applied with advantage as a stimulant and escharotic to foul ulcers, especially ulcerations of the mouth and tonsils connected with a venereal taint. Care should be taken that none of it be swallowed, and the mouth should be washed after using it. It is sometimes applied to suppurated chilblains.

# CHAP. XII.

## VINA – WINES.

WINE is capable, by infusion, of extracting several proximate principles of vegetable substances. From the alcohol it contains, it dissolves a portion of their resin, extract and essential oil ; its watery part dissolves their gum or mucilage ; and being milder and more pleasant to the taste than diluted alcohol, it has been preferred as a solvent ; hence Medicated Wines have long been in use.

It cannot be said, however, to be well adapted to this use. Wine, when not carefully excluded from the air, is apt to become acescent ; and, when it holds vegetable matter in solution, is still more liable to suffer this change. This has been established by the researches of Parmentier; and he has shown that the greater number of medicated wines, if kept for any length of time, become medicated vinegars. This change may modify the powers of the dissolved matter; and in some cases, where the wine is taken in a considerable dose, must prove hurtful to the stomach, especially in dyspeptic affections. Accordingly, few of the medicated wines are now employed. The spontaneous decomposition to which they are liable is sometimes attempted to be obviated by the addition of a little alcohol, but this is attended with imperfect success. For these reasons, the London College has rejected the use of wine altogether, employing diluted spirit in its stead. They have, however, retained the old term of *vinum*, which is certainly objectionable when thus applied, as the old and the new preparations are very dissimilar ; much confusion has hence been produced. As Mr. Phillips has remarked, instead of wine being employed, which is usually of the same strength, the dilute spirit used is, in every preparation, of a different strength : the *vinum antimonii tartarizati*, the *vinum ferri*, and the *vinum veratri*, contain two parts of proof spirit, and three of water ; the *vinum aloes* contains equal parts of spirit and water ; the *vinum colchici* contains one of spirit and two of water ; and *vinum ipecacuanhæ*, and *vinum opii*, contain one part of proof spirit, and one and two-thirds of water.

" Wines," according to the Edinburgh Pharmacopœia, " should be prepared in close vessels, and frequently agitated during their preparation."

VINUM ALOES SOCOTORINÆ. Wine of Socotorine Aloes. Ed.

" Take of Socotorine Aloes, reduced to powder, one ounce ; Lesser Cardamom Seeds, Ginger Root, of each bruised, one drachm ; Spanish White Wine, two pounds. Digest for seven days, and strain."

VINUM ALOES. Wine of Aloes. Lond.

" Take of Extract of spiked Aloes, eight ounces ; Canella Bark, two ounces ; Proof Spirit, Distilled Water, of each four pints. Triturate the aloes with white sand freed from impurities, into powder ; rub the canella bark to powder, and upon these mixed pour

the spirit and water. Macerate for fourteen days, shaking occasionally, and strain."

VINUM ALOES. Wine of Aloes. Dub.

"Take of Socotorine Aloes, four ounces; Canella Alba, an ounce; Spanish White Wine, three pints; Proof Spirit, one pint. Mix the aloes and canella separately reduced to powder, and pour on the wine mixed with the spirit. Macerate for fourteen days, shaking the vessel frequently; lastly, strain the liquor."

THE trituration with sand directed by the London College is designed to facilitate the solution of the aloes, but is not very necessary. Aloes being soluble in wine or spirit, all its virtues are obtained in this solution, and from the presence of the resinous matter of the aloes it is not liable to become acescent. It is a stimulating purgative, which has long been in use under the name of Sacred Tincture. It produces its full effect in the dose of one ounce. In a dose of one or two drachms, it is given to excite the action of the intestines and neighbouring organs, in dyspepsia, amenorrhœa, and similar affections. Repeated small doses of it have been found useful in producing a general lax habit. Dr. A. T. Thomson has given the following formula for preparing another aloetic wine: "Take of Sub-carbonate of Soda, three ounces; of Sub-carbonate of Ammonia, four drachms and a half; of Myrrh in powder, and Extract of Aloes, bruised, each six drachms; Sherry, twenty-four ounces. Macerate for seven days, and strain." This has been much recommended in chlorosis and dyspepsia, and affections of the mesenteric glands in children.

VINUM GENTIANÆ COMPOSITUM. Compound Gentian Wine. Ed.

"Take of Gentian Root, half an ounce; Lance-Leaved Bark, one ounce; Seville Orange-Peel dried, two drachms; White Canella Bark, one drachm; Diluted Alcohol, four ounces; Spanish White Wine, two pounds and a half. On the root and barks cut and bruised, pour first the diluted alcohol; and after twenty-four hours add the wine. Then macerate for seven days, and strain."

THIS wine is designed as a stomachic; and has been regarded as preferable to the tincture, as being more mild and grateful, and therefore better for continued use; but from its tendency to become acescent, it is not adapted to administration in dyspepsia. Its dose is six drachms.

VINUM IPECACUANHÆ. Ipecacuan Wine. Ed.

"Take of Ipecacuan Root bruised, one part; Spanish White Wine, fifteen parts. Macerate for seven days, and strain through paper."

VINUM IPECACUANHÆ. Wine of Ipecacuan. Lond.

"Take of Root of Ipecacuan bruised, two ounces; Proof Spirit, twelve fluid-ounces; Distilled Water, twenty fluid-ounces. Macerate for fourteen days, and strain."

VINUM IPECACUANHÆ. Wine of Ipecacuan. Dub.

"Take of Root of Ipecacuan bruised, two ounces; Spanish White Wine, two pints. Macerate for fourteen days, then strain."

WINE or weak spirit extracts the active matter of Ipecacuan, and

covers its taste and flavour, while it has the advantage of being less pungent than diluted alcohol. According to Dr. A. T. Thomson, a pint of Sherry takes up 100 grains of Ipecacuan, which contain about 16 grains of *Emetia*, or each ounce contains a grain of emetia. This wine is often used as an emetic, especially to children, to whom, from being not ungrateful, it can be given without difficulty. Its dose is one ounce to an adult; one drachm to a child a year old. In doses of twenty to forty minims Ipecacuan Wine is diaphoretic. It is not decomposed by tartarized antimony.

VINUM NICOTIANÆ TABACI. Tobacco Wine. Ed.

"Take of the Dried Leaves of Tobacco, one part; Spanish White Wine, twelve parts. Macerate for seven days, and strain through paper."

UNDER this form Tobacco has been used as a diuretic in dropsy. The dose is thirty drops, gradually increased to sixty or eighty twice a-day. It is liable, however, to excite sickness in this large dose, and in a smaller dose often fails in its diuretic effect.

VINUM OPII. Wine of Opium. Ed. Dud.

"Take of Opium, (Turkey Opium, Dub.) an ounce; Cinnamon Bark bruised, Cloves bruised, of each one drachm, (half a drachm, Dub.); White Spanish Wine, sixteen ounces. Macerate for eight days and strain."

VINUM OPII. Wine of Opium. Lond.

"Take of Extract of Opium, an ounce. Cinnamon Bark bruised, Cloves bruised, each one drachm; Proof-spirit, six fluid-ounces; Distilled Water, ten fluid-ounces. Macerate for eight days and strain."

WINE dissolves the active matter of opium, and has often been used as a menstruum. With the addition of aromatics, it formed the *liquid laudanum* of Sydenham, and was at one time an officinal preparation in the Pharmacopœias, though afterwards excluded, to give place to the tincture of opium. It is now restored, as it had continued in use, and is supposed to have some advantages over the tincture, from the addition of the aromatics in particular; and, from the opium being purified so as to be freed from its peculiar disagreeable smell and taste, this wine is less liable to occasion nausea. It is nearly of the same strength as the tincture. The wine of opium has been recommended by Mr. Ware as the best form under which opium can be used as a local application in chronic ophthalmia, two or three drops of it being introduced under the eye-lids.

VINUM RHEI. Rhubarb Wine. Ed.

"Take of Russian Rhubarb cut, two ounces; Canella Bark bruised, one drachm; Diluted Alcohol, two ounces; Spanish White Wine, fifteen ounces. Macerate for seven days, and strain through paper."

WINE extracts the active matter of rhubarb, and this medicated wine operates as a purgative, in a dose from half an ounce to an ounce. It is a warm and cordial medicine, but the tincture is in general preferred, as more uniform, and not liable to decomposition.

VINUM FERRI. Wine of Iron. Lond.

"Take of Iron, a drachm; Supertartrate of Potash in powder, six drachms; Distilled Water, two pints, or as much as may be required; Proof-spirit, twenty fluid-ounces. Rub together the iron and supertartrate of potash, and expose the mixture to the air for six weeks, stirring it daily with a spatula, and occasionally adding distilled water, so that it may be always moist. Then dry by a gentle heat, rub it to powder, and mix it with thirty fluid-ounces of the distilled water. Filter the solution, and when filtered add the spirit."

THIS preparation is to replace the *Steel Wine* of former Pharmacopœias, which was formed by digesting iron-filings in wine for a month; part of the iron became oxidated, and united with the bi-tartrate of potash existing in the wine. According to Mr. Phillips, in a pint of the steel wine there were dissolved 22 grains of peroxide of iron. In the present preparation there are only 16 grains of peroxide of iron in a pint, but it has the advantage of being more uniform in strength. Its dose is from a drachm to half an ounce, repeated twice or thrice a-day in chlorosis.

VINUM VERATRI. Wine of White Hellebore. Lond.

"Take of the Root of White Hellebore cut, eight ounces; Proof-spirit, a pint; Distilled Water, a pint and a half. Macerate for fourteen days, and strain."

IT was formerly supposed that a strong vinous infusion of white hellebore was the basis of the empirical preparation, Eau Medicinale d'Husson, celebrated for its efficacy in gout, and it was with this view chiefly that the above formula was admitted into the Pharmacopœia. It has now been ascertained, however, that the eau medicinale is prepared from the root of the colchicum autumnale; but at the same time it has been shown, by the researches of Pelletier and Caventou, that the same active principle veratria exists in both vegetables. The preparations of the colchicum are generally preferred, as they are more certain and manageable than those of hellebore. The dose of vinum veratri is from five to ten minims.

VINUM COLCHICI. Wine of Meadow Saffron. Lond.

"Take of the Fresh Root of Colchicum sliced, a pound; Proof-Spirit, four fluid-ounces; Distilled Water, eight fluid-ounces. Macerate for fourteen days, and strain."

THE efficacy of this remedy depends, like the last, upon the veratria it contains, and this wine, or the tincture of the colchicum, is now much used in the treatment of gout. This preparation is, however, liable to fermentation and decomposition. Dr. Thomson recommends, as a better formula, to take an ounce and a half of sliced bulbs of colchicum, dried at a temperature not exceeding 110°, and to pour upon them, reduced to powder, twelve fluid-ounces of good sherry wine. This mixture is to stand seven days in a glass bottle, being agitated twice a-day, and is then, after straining, ready for use. Its dose is from twenty to sixty minims in water, or some bitter infusion, or with magnesia in an effervescing draught. This wine is used also as a diuretic.

# CHAP. XIII.

## ACETICA—MEDICATED VINEGARS.

Vinegar is capable of dissolving all those proximate principles of vegetables which are soluble in water; and it has with respect to some vegetables an advantage, that by combining with their alkaline principles, it renders these more soluble and more active. The dilute pyroligneous acid, now introduced into the London Pharmacopœia, is preferable to distilled vinegar, as less liable to suffer spontaneous decomposition. It is proper to remember, that alkalis and alkaline carbonates are incompatible with these preparations.

Acidum aceticum aromaticum. Aromatic Vinegar. Ed.

"Take of the Dried Tops of Rosemary, the Dried Leaves of Sage, of each an ounce; Lavender Flowers dried, half an ounce; Cloves bruised, half a drachm; Weak Acetic Acid, two pounds. Macerate for seven days, and strain the expressed liquor through paper."

This is an improved formula for a preparation long known by the names of Marseilles Vinegar, Vinaigre des quatre voleurs, Acetum Prophylacticum, which had attained celebrity as an antiseptic and preservative against contagion. Its name and use arose, it is said, from the confession of four thieves, who, during the plague of Marseilles, plundered the dead bodies, and when arrested, stated, on condition of their lives being spared, that it was by the use of this vinegar they had been preserved from the infection. From the impregnation of the vinegar with the flavour of the aromatic vegetables it is a grateful perfume, but it is weak, and its odour is soon lost.

Acidum aceticum camphoratum. Camphorated Acetic Acid. Ed.

"Take of strong Acetic Acid, six ounces; Camphor, half an ounce. Rub the camphor with a little alcohol into powder, which put into the acid, that it may be dissolved."

Acidum aceticum camphoratum. Dub.

"Take of Acetic Acid, by measure, six ounces; Camphor, half an ounce; Rectified Spirit of Wine, as much as may be sufficient. Reduce the camphor to powder by the aid of the spirit, then add the acid, and dissolve."

Camphor is soluble in the concentrated acetic acid, and the solution has an odour highly fragrant and pungent. It has been used as a grateful stimulating perfume, and forms what is named Aromatic Spirit of Vinegar. As it is extremely volatile, it should be kept in bottles well closed with glass stoppers. An easy way of preparing a similar perfume, mentioned by Dr. Paris, is to put a drachm of acetate of potash into a phial, with a few drops of some essential oil, as that of cloves, lavender, or rosemary, and pour on it 20 minims of sulphuric acid.

Acidum aceticum scilliticum. Vinegar of Squill. Ed.

"Take of Dried Squill, one ounce; Weak Acetic Acid, fifteen ounces; Strong Alcohol, an ounce and a half. Macerate the squill with the acid for seven days, then express the liquor and add the alcohol, and when the impurities have subsided, pour off the clear liquor."

ACETUM SCILLÆ. Vinegar of Squill. Lond.

"Take of Squill Root, recently dried, a pound; Diluted Acetic Acid, six pints; Proof-spirit, half a pint. Macerate the squill root with the acid in a close glass vessel, with a gentle heat for twenty-four hours; then express, and put aside, that the impurities may subside; lastly, add the spirit to the pure liquor."

ACETUM SCILLÆ. Vinegar of Squill. Dub.

"Take of the Bulb of Squill, sliced and recently dried, half a pound; Distilled Vinegar, three pints; Rectified Spirit, by measure, four ounces. Macerate the squill root with the vinegar for four days in a glass vessel, agitating frequently; then express the vinegar, to which poured off, after the impurities subside, add the spirit."

VINEGAR appears to dissolve the active matter of squill without much impairing its powers: the addition of the alcohol is designed to counteract any spontaneous decomposition to which the vinegar might be liable. Under this form, squill has long been employed as an expectorant and diuretic, and sometimes in larger quantity as an emetic. Its dose is one drachm, mixed with some aromatic distilled water. The proportion of squill ordered by the different Colleges is very various, and if all its active matter is dissolved, must afford preparations of unequal strength. They soon become turbid, and deposite tannin and citrate of lime, but do not lose their medicinal quality.

ACETUM COLCHICI. Vinegar of Meadow Saffron. Lond. Dub.

"Take of the Fresh Root of Meadow Saffron cut, one ounce; Diluted Acetic Acid, (Distilled Vinegar, Dub.) a pint; Proof-spirit, a fluid-ounce. Macerate the root with the acid in a close glass vessel for three days; then press it out, and put it aside, that the impurities may subside; lastly, add the spirit to the clear liquor."

THE veratria which is present in colchicum is dissolved by vinegar, hence this preparation has all the active matter of the vegetable; the spirit is added to prevent decomposition. It was used at one time as a diuretic in dropsy, but is so uncertain in its operation, that in modern practice it is little employed in that disease. It is given, like the other preparations of colchicum, as an anodyne in gout and neuralgia, and is considered by Dr. Scudamore as the best form of that remedy.

ACETUM OPII. Vinegar of Opium. Dub.

"Take of Turkey Opium, four ounces; Distilled Vinegar, a pint. Rub the opium into a pulp with a little of the vinegar, and add the remainder of the vinegar; macerate the mixture in a closed vessel for seven days, with frequent agitation; then pour off the liquor, and strain."

THIS preparation has been introduced into the Dublin Pharma-

copœia as a convenient form of acetate of morphia. It has been already mentioned, (p. 85), that the salts of morphia are preferable to laudanum or solid opium, because, while they have all the sedative and anodyne power of these, they do not act in so unpleasant a manner on the head and stomach. The laudanum of Rousseau, Black drop and Liquor opii sedativus, are forms of the acetate of morphia, which on this account have been extensively used; and the present preparation, from the uniformity of its strength, and simplicity of the mode of preparation, will be a good substitute for them. It is rather stronger than laudanum in the proportion of three to two. Dr. Montgomery states, that he has found it superior to every other preparation of opium in relieving the pain of cancer uteri. It has a tendency to affect the bladder, which laudanum has not, and has in some cases produced suppression of urine. It may be given in doses of from ten to twenty drops in some aromatic water.

Citrate of morphia (p. 85.) may be prepared by rubbing together in a mortar two ounces of crystallized citric acid, macerating these with half a pound of water for twenty-four hours, and straining.

## CHAP. XVI.

### TINCTURÆ—TINCTURES.

Tinctures are solutions usually of vegetable, sometimes, however, of animal, and even of mineral substances, in spiritous liquors. The solvent may be alcohol, either pure, diluted with water, or impregnated with ammonia or ether. Alcohol dissolves the resin, camphor, extract and essential oil of plants; it is more particularly employed as the menstruum for substances purely resinous, or the powers of which reside in the resin. Where a portion of gum is mingled with the resin, or where tannin or extractive matter is the active principle, diluted alcohol is the proper solvent: it in general dissolves the active matter of all entire vegetable substances, as the bark, leaves, flowers; and wherever it can be properly applied, it is preferable to pure alcohol, both as more economical, and as less pungent. Alcohol, impregnated with ammonia, is employed only in forming tinctures of a few substances, with the medicinal operation of which ammonia is supposed to coincide.

Tinctures usually contain the active matter of the substances from which they are prepared in a more concentrated state than infusions or decoctions do, the power of the solvent being much greater; hence they require to be given only in a small dose. The power of the solvent, which is otherwise considerable, may, therefore, in general be neglected. They have the still more important advantage of not being liable to spontaneous decomposition; the affinities of the elements of vegetable matter, whence new combinations are established, which are favoured by water, being counteracted by al-

cohol ; and hence most tinctures, if they are kept secluded from the air, so as to prevent the loss of the alcohol by evaporation, can be preserved any length of time without decomposition.

Tinctures are prepared by infusing the materials reduced to a coarse powder in the spirit, with frequent agitation, but without the application of heat. By applying heat, the solvent power is so far promoted, that the impregnation is effected in a shorter time ; but the inactive and grosser matter, it has been supposed, is frequently liable to be extracted, and the high temperature is farther unnecessary, as, by allowing the solvent to remain a sufficient time (seven days commonly, or as the London College usually direct, fourteen days,) on the ingredients, it is fully saturated. Alkalis were at one time supposed to increase the solvent power both of alcohol and diluted alcohol, the tincture being of a much deeper colour when a small portion had been added. But this arises, in part at least, from the action of the alkali on the colouring matter, as the same effect is obtained when they are added to a tincture already prepared ; and even where they increase the solubility of some principles, as of resinous matter, they do not always coincide in medicinal operation with the substance operated on, while they render the tincture much more nauseous.

It is found that more powerful tinctures of vegetables are formed when the plants have been previously carefully dried.

Some tinctures are liable to decomposition on diluting them with water, those especially prepared with pure alcohol, in which resinous matter chiefly is dissolved, the resin being precipitated. Even some tinctures prepared with diluted alcohol hold dissolved so much resin that they are rendered turbid by dilution with water ; others, which contain extractive matter chiefly, or tannin, remain transparent. It sometimes happens even that a decomposition ensues on mixing a tincture prepared with alcohol with another prepared with diluted alcohol. Such decompositions require to be attended to in their administration, and to be so far obviated, at least when the precipitation is copious, as that by trituration with mucilage the resinous matter shall be diffused.

" Tinctures are to be digested in close glass vessels, and frequently shaken during their preparation." Ed.

The general directions in the London and Dublin Pharmacopœias are nearly the same.

TINCTURA ACACIÆ CATECHU. Tincture of Catechu. Ed.

" Take of Extract of Catechu in powder, three ounces ; Cinnamon bruised, two ounces ; Weaker Alcohol, two pounds and a half. Digest for seven days, and strain through paper."

TINCTURA CATECHU. Tincture of Catechu. Dub. Lond.

" Take of Extract of Catechu, three ounces ; Cinnamon Bark bruised, two ounces ; Proof-spirit, two pints. Macerate for seven days, (fourteen, Lond.) and strain."

CATECHU, consisting almost entirely of tannin and extractive matter, is dissolved by diluted alcohol, and is rendered more grateful by the cinnamon. It is a very pleasant astringent, and is employed in

all those cases where the use of astringents is indicated, as in uterine fluxes, diarrhœas, &c.; dose one to three drachms, taken either in water or wine. It is said to be a useful and grateful addition to the mistura cretæ in diarrhœa. Cinnamon is frequently added to it.

TINCTURA ALOES SOCOTORINÆ. Tincture of Aloes. Ed.

"Take of Socotorine Aloes in powder, half an ounce; Extract of Liquorice, one ounce and a half; Stronger Alcohol, four ounces; Water, one pound. Digest for seven days, and pour off the tincture when clear."

TINCTURA ALOES. Tincture of Aloes. Lond.

"Take of Extract of Spiked Aloes in powder, half an ounce; Extract of Liquorice, an ounce and a half; Water, a pint; Rectified Spirit, four fluid-ounces. Macerate for fourteen days, and strain."

TINCTURA ALOES. Tincture of Aloes. Dub.

"Take of Socotorine Aloes in powder, half an ounce; Extract of Liquorice, an ounce and a half, dissolved in eight ounces of Water; Proof-spirit, by measure, eight ounces. Digest for seven days, then strain."

IN this preparation the liquorice is designed to cover the taste, which it does very imperfectly. The tincture may be employed as a cathartic in the dose of an ounce, but is seldom used, from its intense bitterness, being better prescribed under the form of pill.

TINCTURA ALOES ÆTHEREA. Ethereal Tincture of Aloes. Ed.

"Take of Socotorine Aloes, Myrrh, of each in powder, one ounce and a half; English Saffron cut, one ounce; Sulphuric Ether and Alcohol, a pound. Digest the myrrh with the ether for four days; then add the saffron and aloes. Digest again for four days; and when the impurities have subsided, pour off the tincture."

IF the ingredients of this tincture were digested together, the spirit would be so much saturated with the aloes as to take up little of the myrrh; but by digesting it first on the myrrh, it dissolves a larger quantity of it, and is capable of dissolving afterwards a sufficient proportion of the aloes and saffron. The spirit of sulphuric ether affords a more grateful tincture than alcohol, but it is difficult to preserve the tincture long without the escape of the ether from its volatility. In the dose of six drachms it acts as a cathartic.

TINCTURA ALOES ET MYRRHÆ. Tincture of Aloes and Myrrh. Ed.

"Take of Myrrh in powder, two ounces; Strong Alcohol, one pound and a half; Water, half a pound. Mix the alcohol with the water; then add the myrrh; digest for four days; and lastly, add of Socotorine Aloes in powder, one ounce and a half; English Saffron sliced, one ounce. Digest again for three days, and pour off the pure tincture."

TINCTURA ALOES COMPOSITA. Compound Tincture of Aloes. Lond.

"Take of Extract of Aloes in powder, Saffron, of each three ounces; Tincture of Myrrh, two pints. Macerate fourteen days, and strain."

TINCTURA ALOES COMPOSITA. Compound Tincture of Aloes. Dub.

"Take of Tincture of Myrrh, two pints; Socotorine Aloes in powder, three ounces. Digest for fourteen days, then strain."

This tincture differs in little from the former but in the menstruum, and in being stronger. Being less grateful, it is seldom administered internally, but is used as an application to bleeding wounds, and a stimulant to foul ulcers. As a purgative the dose of the London tincture is from one to two fluid-drachms. The saffron is omitted by the Dublin College, as adding unnecessarily to the expense.

TINCTURA AMOMI REPENTIS. Tincture of Cardamom. Ed.

"Take of Lesser Cardamom Seeds bruised, four ounces; Diluted Alcohol, two pounds and a half. Digest for seven days, and strain through paper."

TINCTURA CARDAMOMI. Tincture of Cardamom. Lond.

"Take of Cardamom Seeds bruised, three ounces; Proof-spirit, two pints. Macerate for fourteen days, and strain."

This tincture has merely aromatic flavour and pungency, and as these are not considerable, it is little used. The dose is a drachm or two.

TINCTURA AMOMI ZINGIBERIS. Tincture of Ginger. Ed.

"Take of Ginger Root bruised, two ounces; Diluted Alcohol, two pounds and a half. Digest for seven days, and strain through paper."

TINCTURA ZINGIBERIS. Tincture of Ginger. Lond.

"Take of Ginger Root cut, two ounces; Rectified Spirit, two pints. Macerate for fourteen days, and strain."

TINCTURA ZINGIBERIS. Tincture of Ginger. Dub.

"Take of Ginger Root, reduced to a coarse powder, two ounces; Proof-spirit, two pints. Digest in a gentle heat for seven days, then strain."

This tincture contains the pungency of the ginger, and may be used as an aromatic, to cover the taste or flavour, or promote the operation of more active remedies. To obviate flatulence, ginger is generally taken in substance. As this tincture is always muddy when prepared with proof-spirit, the London College now order rectified spirit, which does not take up the gummy matter. According to Mr. Phillips, it is sometimes found useful when gout attacks the stomach. The dose is one or two drachms.

TINCTURA ARISTOLOCHIÆ SERPENTARIÆ. Tincture of Snake-Root. Ed.

"Take of Virginian Snake-Root bruised, two ounces; Cochineal in powder, one drachm; Diluted Alcohol, two pounds and a half. Digest for seven days, and strain through paper."

TINCTURA SERPENTARIÆ. Tincture of Snake-Root. Lond. Dub.

"Take of Snake-Root, three ounces; Proof-spirit, two pints. Macerate fourteen (seven, Dub.) days, and strain."

This tincture is sometimes used as a diaphoretic, as a bitter in

dyspepsia, or along with infusion of bark in typhus, but is not of much service; the dose is two drachms.

Tinctura benzoini composita. Compound Tincture of Benzoin. Ed.

"Take of Benzoin in powder, three ounces; Balsam of Tolu, two ounces; Socotorine Aloes in powder, half an ounce; Strong Alcohol, two pounds. Digest for seven days, and strain through paper."

Tinctura benzoini composita. Lond. Tinctura benzoes composita. Dub. Compound Tincture of Benzoin.

"Take of Benzoin, three ounces; Storax Balsam strained, two ounces; Balsam of Tolu, an ounce; Extract of Spiked Aloes, half an ounce; Rectified Spirit, two pints. Macerate for fourteen days, and strain."

This is used externally as a styptic to recent superficial wounds, and forms a useful corrugating and agglutinating application. It has long been in use under the name of Wade's Balsam and Friar's Balsam. A piece of linen moistened with it stops the hæmorrhage from a slight wound, and is said to cause it to heal by the first intention; this however is denied by Mr. Phillips, who is of opinion that it prevents the healing. It is also sometimes applied as a stimulant to foul ulcers. It is sometimes, but seldom, taken internally in chronic catarrh and asthma. Water decomposes it, throwing down resinous matter.

Tinctura bonplandiæ trifoliatæ. Tincture of Angustura. Ed.

"Take of Angustura Bark in powder, two ounces; Diluted Alcohol, two pounds and a half. Digest for seven days, then strain through paper."

Tinctura angusturæ. Tincture of Angustura. Dub.

"Take of Angustura Bark in coarse powder, two ounces; Proof-spirit, two pints. Macerate for fourteen days, then strain."

Diluted alcohol dissolves the active matter of angustura; and under this form it has been sometimes given in dyspepsia, in a dose of two drachms occasionally.

Tinctura camphoræ. Tincture of Camphor. Ed.

"Take of Camphor, one ounce; Strong Alcohol, one pound Mix, so as to dissolve the camphor. It may be also made with a double or triple proportion of camphor."

Spiritus camphoræ. Spirit of Camphor. Lond.

"Take of Camphor, four ounces; Rectified Spirit, two pints.— Mix, so as to dissolve the camphor."

Tinctura camphoræ, sive Spiritus camphoratus. Tincture of Camphor, or Camphorated Spirit. Dub.

"Take of Camphor, an ounce; Rectified Spirit, half a pint. Mix, so as to dissolve the camphor."

This solution is used externally as a stimulating and anodyne application in chronic rheumatism and spasmodic pains, being rubbed on the part. It is applied in a similar manner to bruises and strains, to remove the swelling and relieve the pain. Linen moistened with it is used as an application to chilblains; and it is sometimes added

in small quantity to collyria employed in ophthalmia. It is decomposed by water, which, combining with the spirit, throws down the camphor.

LINIMENTUM CAMPHORÆ COMPOSITUM. Compound Camphor Liniment. Lond. Dub.

"Take of Camphor, two ounces; Solution of Ammonia, six ounces; Spirit of Lavender, a pint. Mix the solution of ammonia with the spirit, and distil a pint from a glass retort with a gentle heat. Dissolve the camphor in the distilled liquor."

DR. DUNCAN is of opinion, that this liniment might be prepared as well without the distillation, by mixing the strong aqua ammoniæ of the Edinburgh College with the spirit of lavender. The liniment is applied to the same uses as the preceding, but the addition of the ammonia renders it more powerful as a stimulant and rubefacient.

TINCTURA CANTHARIDIS VESICATORIÆ. Tincture of Cantharides. Ed.

"Take of Cantharides bruised, one drachm; Diluted Alcohol, one pound. Digest for seven days, and strain through paper."

TINCTURA CANTHARADIS. Tincture of Spanish Flies. Lond.

"Take of Cantharides bruised, three drachms; Proof-spirit, two pints. Macerate for fourteen days, and strain."

TINCTURA CANTHARIDIS. Tincture of Cantharides. Dub.

"Take of Cantharides in powder, two drachms; Proof-spirit, one pint and a half. Digest for seven days, and filter."

DILUTED alcohol extracts and holds dissolved the acrid matter of cantharides, and it is under this form that the substance has been generally employed internally, being more manageable in its dose than it is in powder. It has been given as a diuretic in dropsy, and as a remedy in incontinence of urine, gleet and leucorrhœa. Its dose is from ten to twenty drops, increased gradually until some sensible operation is produced. Dr. C. Smyth has remarked, however, that in ischuria, arising from debility of the coats of the bladder, he had found little advantage derived from the tincture, while in substance the cantharides had been successful. The tincture is also employed externally as a rubefacient, frequently in conjunction with camphor liniment. Dr. A. Thomson recommends its application to frost-bitten parts.

TINCTURA CASTOREI. Tincture of Castor. Ed.

"Take of Russian Castor in powder, one ounce and a half; Strong Alcohol, one pound. Digest for seven days, and strain through paper."

TINCTURA CASTOREI. Tincture of Castor. Lond. Dub.

"Take of Castor (Russian, Dub.) in powder, two ounces; Rectified Spirit, (Proof-spirit, Dub.), two pints. Macerate for seven days, and strain."

CASTOR is a substance nearly inert; and this tincture, in which a small quantity only is dissolved, can scarcely be supposed to have any medicinal efficacy. It is given sometimes as an antispasmodic

in hysteria, in a dose of from half a drachm to a drachm. It is more grateful when prepared with alcohol than when prepared with proof-spirit.

TINCTURA CINCHONÆ LANCIFOLIÆ. Tincture of Peruvian Bark. Ed.
TINCTURA CINCHONÆ. Dub.

"Take of Lance-leaved Peruvian Bark in powder, four ounces; Diluted Alcohol, two pounds and a half, (Proof-spirit, two pints, Dub.) Digest for seven days, and strain through paper."

TINCTURA CINCHONÆ. Tincture of Bark. Lond.

"Take of Lance-leaved Bark in powder, seven ounces; Proof-spirit, two pints. Macerate for fourteen days, and strain."

THE proportion of bark in the formula of the London College to that of spirit, is nearly double that of the others, whether with the effect of rendering the tincture much stronger may be considered as doubtful. The active matter of bark is extracted by diluted alcohol, but so sparingly, that it may be doubted whether in the tincture the powers of the menstruum are not greater than those of the bark. It cannot therefore be employed where large quantities of cinchona are required. It is used only as a bitter in dyspepsia, occasionally, in a dose of two drachms; and for this purpose the compound tincture of bark, to be immediately noticed, is preferable; though both are liable to the objection common to all these bitter tinctures, that of accustoming the stomach to the stimulus of ardent spirit, and leading to the habit of dram drinking.

TINCTURA CINCHONÆ COMPOSITA. Compound Tincture of Cinchona. Ed.

"Take of Lance-leaved Cinchona Bark in powder, two ounces; Orange Rind dried, one ounce and a half; Virginian Snake-root bruised, three drachms; Saffron sliced, one drachm; Cochineal in powder, two scruples; Diluted Alcohol, twenty ounces. Digest for seven days, and strain through paper."

TINCTURA CINCHONÆ COMPOSITA. Compound Tincture of Cinchona. Lond. Dub.

"Take of Peruvian Bark powdered two ounces; Orange-peel dried, an ounce and a half, (an ounce, Dub.); Virginian Snake-Root bruised, three drachms; Saffron, one drachm; Cochineal in powder, two scruples; Proof-spirit, twenty fluid-ounces. Macerate for fourteen days, and strain."

THIS is the composition known under the name of Huxham's Tincture of Bark. It contains much less cinchona, but is more grateful than the simple tincture; and from the substances added, is probably a better stomachic: its dose is the same. It is principally in dyspeptic affections that it is employed. The powers of the menstruum render its continued use hurtful, but it may be taken occasionally with advantage.

TINCTURA CINNAMOMI COMPOSITA. Compound Tincture of Cinnamon. Ed.

"Take of Cinnamon Bark bruised, Lesser Cardamom Seeds bruis-

ed, each one ounce; Long Pepper in powder, two drachms; Diluted Alcohol, two pounds and a half. Digest for seven days, and strain through paper."

TINCTURA CINNAMOMI COMPOSITA. Compound Tincture of Cinnamon. Lond.

"Take of Cinnamon Bark bruised, six drachms; Cardamom Seeds bruised, three drachms; Long Pepper, in powder, Ginger Root cut, of each two drachms; Proof-spirit, two pints. Macerate for fourteen days, and strain."

THIS is a grateful aromatic tincture, seldom used by itself, but frequently added to other tinctures, or to mixtures, to communicate flavour and pungency. It is thus often used in combination with bitters and astringents. The dose is a drachm or two.

TINCTURA COLOMBÆ. Tincture of Colomba. Ed.

"Take of the Root of Colombo in powder, two ounces; Diluted Alcohol, two pounds. Digest for seven days, and strain through paper."

TINCTURA CALUMBÆ. Tincture of Colomba. Lond. Dub.

"Take of Colomba cut, two ounces and a half; Proof-spirit, two pints. Macerate for fourteen days, and strain."

COLOMBA does not yield its active matter very abundantly either to watery or spiritous menstrua; at least this tincture is not strong, and cannot be employed for any of the more important purposes for which this root is prescribed. It is therefore used merely as a bitter tincture in dyspepsia, in a dose of three or four drachms, when the stomach will not bear the colomba in powder; and it may be conjoined with solutions of iron, as it is not blackened by them.

TINCTURA CONII MACULATI. Tincture of Hemlock. Ed.

"Take of Hemlock Leaves dried, two ounces; Lesser Cardamom Seeds bruised, half an ounce; Diluted Alcohol, sixteen ounces. Diges for seven days, and strain through paper."

TINCTURA CONII. Tincture of Hemlock. Dub.

"Take of Hemlock Leaves dried, two ounces; Cardamom Seeds bruised, an ounce; Proof-spirit, a pint. Macerate for seven days, and strain."

THIS tincture possesses all the properties of the plant, and is given as an anodoyne in those cases where the use of the plant is indicated, as in cancer, especially of the uterus.

TINCTURA CONVOLVULI JALAPÆ. Tincture of Jalap. Ed.

"Take of the Root of Jalap in powder, three ounces; Diluted Alcohol, fifteen ounces. Digest for seven days, and strain through paper."

TINCTURA JALAPÆ. Tincture of Jalap. Lond. Dub.

"Take of Jalap Root in powder, eight ounces; Proof-spirit, two pints. Macerate for fourteen days, and strain."

THE activity of jalap resides in a resinous matter, which in this tincture is extracted along with a portion of mucilage. It may be given as a cathartic, in a dose of four or six drachms. Jalap, however, is usually given in substance, and scarcely ever under this

form. The Edinburgh Tincture is weaker than that of the other Colleges.

TINCTURA CROCI SATIVI. Tincture of Saffron. Ed.

"Take of English Saffron cut, one ounce; Diluted Alcohol, fifteen ounces. Digest for seven days, and strain through paper."

THIS tincture is to be valued only for its colour.

TINCTURA CROTONIS ELEUTHERIÆ. Tincture of Croton Eleutheria. Ed.

"Take of the Bark of Cascarilla bruised, four ounces; Diluted Alcohol, two pounds and a half. Digest for seven days, and strain."

TINCTURA CASCARILLÆ. Tincture of Cascarilla. Lond. Dub.

"Take of Cascarilla Bark, four ounces; Proof-spirit, two pints. Macerate for fourteen (seven, Dub.) days, and strain."

CASCARILLA is so little employed in modern practice, that there is scarcely any advantage in having its tincture as an officinal preparation, and the present tincture may be regarded merely as a concealed dram.

TINCTURA DIGITALIS PURPUREÆ. Tincture of Foxglove. Ed.

"Take of the dried Leaves of Foxglove, one ounce; Diluted Alcohol, eight ounces. Digest for seven days, and strain through paper."

TINCTURA DIGITALIS. Tincture of Foxglove. Lond.

"Take of the dried Leaves of Foxglove, four ounces; Proof-spirit, two pints. Macerate for fourteen days, and strain."

TINCTURA DIGITALIS. Tincture of Foxglove. Dub.

"Take of the Leaves of Foxglove (rejecting those of a large size) dried and reduced to coarse powder, two ounces; Proof-spirit, one pint. Macerate for seven days, then strain."

THE active matter of foxglove appears to be completely extracted by diluted alcohol. The tincture is not, however, so much used to obtain the operation of the plant as a diuretic, as to produce its narcotic effects, as in hæmoptysis, phthisis, diseases of the heart and mania, to lessen the force of the circulation. It has also the important advantages, that it can be kept without the powers of the digitalis being impaired, and that its dose is easily regulated. The usual dose is ten drops, which, according to the general rules observed in the administration of digitalis, is to be continued, and if necessary, cautiously increased, until its effects are obtained. Mr. Brande has pointed out the danger of a practice which has sometimes been followed, of allowing the tincture of digitalis to stand with the leaves in it; the last portion acquires such strength, that it may produce fatal effects.

TINCTURA FERULÆ ASSAFŒTIDÆ. Tincture of Assafœtida. Ed.

"Take of Assafœtida, four ounces; Strong Alcohol, two pounds and a half. Digest for seven days, and strain through paper."

TINCTURA ASSAFŒTIDÆ. Tincture of Assafœtida. Lond.

"Take of Assafœtida, four ounces; Rectified Spirit, two pints. Macerate for fourteen days, and strain."

TINCTURA ASSAFŒTIDÆ. Tincture of Assafœtida. Dub.

"Take of Assafœtida, four ounces; Rectified Spirit, two pints; Water, half a pint. To the assafœtida rubbed with the water add the spirit. Macerate for fourteen days, then strain."

ALCOHOL is used as the solvent in this tincture, as it is less disagreeable than when made with proof-spirit. As a remedy in tympanitis and hysteria it is sometimes given in a dose of one drachm; but in any quantity in which it can be given, so that the operation of the solvent shall not be predominant, its effects must be extremely trivial. It is decomposed on mixing it with water, and forms a white turbid liquor.

TINCTURA GALLARUM. Tincture of Galls. Ed.

"Take of Galls in powder, two ounces; Diluted Alcohol, sixteen ounces. Digest for seven days, and strain through paper."

TINCTURA GALLARUM. Tincture of Galls. Dub.

"Take of Galls in powder, four ounces; Proof-spirit, two pints. Digest for seven days, and filter."

THIS is perhaps the most powerful of all the astringent tinctures, and is given in a dose of one or two fluid-drachms.

TINCTURA GENTIANÆ COMPOSITA. Compound Tincture of Gentian. Ed.

"Take of Gentian Root sliced and bruised, two ounces; Dried Seville Orange-peel bruised, one ounce; Canella Bark bruised, half an ounce; Cochineal in powder, half a drachm; Diluted Alcohol, two pounds and a half. Digest for seven days, and strain through paper."

TINCTURA GENTIANÆ COMPOSITA. Compound Tincture of Gentian. Lond. Dub.

"Take of Gentian Root cut and bruised, two ounces; Orange-peel dried, an ounce; Cardamom Seeds husked and bruised, half an ounce; Proof-spirit, two pints. Macerate for fourteen days with a gentle heat, and strain."

IN this tincture, the bitterness of the gentian, is extracted, gentianine being soluble in alcohol, (p. 141,) and it is rendered more grateful by the aromatic quality of the orange-peel and canella. It is used as a stomachic in a dose of two or three drachms, in cases where the stomach is disordered from any occasional cause. In more permanent forms of dyspepsia it cannot be employed with equal advantage; and the continued use of tinctures of this kind ought always to be avoided, as being liable to the pernicious consequence of accustoming the stomach to the stimulus of ardent spirit. The first tincture is coloured red, the other not.

TINCTURA GUAJACI OFFICINALIS. Tincture of Guaiac. Ed.

"Take of the Resin of Guaiac in powder, six ounces; Strong Alcohol, two pounds and a half. Digest for seven days, and strain through paper."

TINCTURA GUAIACI. Tincture of Guaiac. Lond.

"Take of the Gum-Resin of Guaiac rubbed to powder, half a pound; Rectified Spirit, two pints. Macerate for fourteen days, and strain."

TINCTURA GUAJACI. Tincture of Guaiac. Dub.

"Take of Guaiac, four ounces; Rectified Spirit, two pints. Macerate for seven days, and strain."

THIS tincture may be given in a dose of two or three drachms, and has sometimes been employed as a form of giving guaiac as a stimulating sudorific in rheumatism and gout; but it is inferior in activity to the Ammoniated Tincture; and it forms a very ungrateful mixture with water, from the copious precipitation of its resinous matter.

TINCTURA HELLEBORI NIGRI. Tincture of Black Hellebore. Ed.

"Take of Black Hellebore Root bruised, two ounces; Cochineal, in powder, fifteen grains; Diluted Alcohol, fifteen ounces. Digest for seven days, and strain through paper."

TINCTURA HELLEBORI NIGRI. Tincture of Black Hellebore. Lond. Dub.

"Take of Black Hellebore Root cut, four ounces; Proof-spirit, two pints. Macerate for fourteen (digest for seven, Dub.) days, and strain."

IT was under the form of this tincture that black hellebore was celebrated by Mead as an emmenagogue, (p. 209,) a quality, probably referable to its drastic cathartic powers. Cullen remarks, with regard to it, that he had never found it successful; and it is now little used, especially as it is capricious in its action. Rectified spirit would dissolve more of the active resinous matter, (p. 195.) A tea-spoonful of it may be taken twice a-day, in warm water.

TINCTURA HUMULI LUPULI. Tincture of Hops. Ed.

"Take of Hops, five ounces; Diluted Alcohol, two pounds and a half. Digest for seven days, express the tincture, and strain through paper."

TINCTURA HUMULI. Tincture of Hops. Lond. Dub.

"Take of Hops, five ounces; Proof-spirit, two pints. Macerate for fourteen days, (frequently shaking, Dub.) and strain."

HOPS having been introduced as a narcotic, designed to be employed as a substitute for opium, in cases where, from idiosyncrasy or other causes, the latter cannot be employed, the tincture affords a convenient form for its administration. It has been supposed, but very erroneously, to be nearly of the same strength as tincture of opium; it requires in general to be given in a dose from half a drachm to a drachm, or more, to produce any sensible effect. The hops, in making the tincture, should be rubbed into powder, as they will be apt to absorb and retain a large quantity of the alcohol.

TINCTURA HYOSCYAMI NIGRI. Tincture of Black Henbane. Ed.

"Take of the Dried Leaves of Black Henbane, one ounce; Diluted Alcohol, eight ounces. Digest for seven days, and strain through paper."

TINCTURA HYOSCYAMI. Tincture of Henbane. Lond. Dub.

"Take of the Dried Leaves of Henbane, four (five, Dub.) ounces; Proof-spirit, two pints. Macerate for fourteen (seven, Dub.) days, and strain."

Henbane is much employed in modern practice chiefly as a substitute for opium, where it is desirable to avoid the constipating effect of the latter, or where, from idiosyncrasy, opium occasions disagreeable symptoms. The tincture is of nearly the same strength in all the Pharmacopœias. Its dose is 25 or 30 drops. A combination of it with tincture of opium proves a more certain anodyne and narcotic than when it is given alone, and is in a great measure free from the inconveniences which opium by itself is liable to produce; this combination is advisable when a laxative effect is not desired.

Tinctura kino. Tincture of Kino. Ed.

"Take of Kino in powder, two ounces; Diluted Alcohol, one pound and a half. Digest for seven days, and strain."

Tinctura kino. Tincture of Kino. Lond. Dub.

"Take of Kino in powder, three ounces; Rectified Spirit, two pints. Macerate for fourteen (seven, Dub.) days, and strain."

Kino consists principally of tannin; it is entirely soluble in alcohol. The dose of this tincture is from half a drachm to a drachm; it is not unfrequently prescribed as an astringent, particularly in obstinate diarrhœas. It is not, however, so efficacious as the tincture of catechu.

Tinctura lauri cinnamomi. Tincture of Cinnamon. Ed.

"Take of Cinnamon Bark bruised, three ounces; Diluted Alcohol, two pounds and a half. Digest for seven days, and strain through paper."

Tinctura cinnamomi. Tincture of Cinnamon. Lond. Dub.

"Take of Cinnamon Bark bruised, three ounces, (three ounces and a half, Dub.); Proof-spirit, two pints. Macerate for fourteen days, and strain."

The diluted alcohol is impregnated with the aromatic flavour of the cinnamon, and it is merely as possessing this flavour and a slight astringency that this tincture is used in mixtures. A little diluted sulphuric acid is sometimes added to it.

Tinctura myrrhæ. Tincture of Myrrh. Ed.

"Take of Myrrh in powder, three ounces; Strong Alcohol, twenty ounces; Water, ten ounces. Digest for seven days, and strain through paper."

Tinctura myrrhæ. Tincture of Myrrh. Lond.

"Take of Myrrh bruised, four ounces; Rectified Spirit, three pints. Macerate for fourteen days, and strain."

Tinctura myrrhæ. Tincture of Myrrh. Dub.

"Take of Myrrh bruised, three ounces; Proof-Spirit, a pint and a half; Rectified Spirit, half a pint. Digest for seven days, then strain."

Myrrh being principally resinous, is not entirely soluble in common proof-spirit, and therefore rectified spirit is properly ordered for its solution in the London Pharmacopœias. The tincture is used principally as an external stimulant and antiseptic application, more

especially in affections of the teeth and gums, either directly applied, or added to detergent gargles. It is used externally for cleaning foul ulcers, and promoting the exfoliation of carious bones.

TINCTURA OPII, *sive Thebaica; vulgo Laudanum liquidum.* Tincture of Opium. Ed.

"Take of Opium, two ounces; Diluted Alcohol, two pounds. Digest for seven days, and strain through paper."

TINCTURA OPII. Tincture of Opium. Lond.

"Take of Hard Opium in powder, two ounces and a half; Proof-spirit, two pints. Macerate for fourteen days, and strain."

TINCTURA OPII. Tincture of Opium. Dub.

"Take of Turkey Opium in coarse powder, ten drachms; Proof-spirit, a pint. Macerate for fourteen days, then strain."

IN this tincture, about two-thirds of the opium employed are dissolved; the residuum consists chiefly of impurities, but still contains a considerable portion of morphia. The proportion of opium to each drachm of the tincture is five grains, but by evaporation it is found to yield only three grains and a half; twenty-five drops are supposed to be equal in power to one grain of solid opium, and is the dose commonly given to a person not accustomed to it. It is of the same strength nearly as ordered in the different Pharmacopœias. The London College formerly employed purified opium, for which they have now properly substituted crude opium, both as it was without any advantage to use purified opium in a preparation in which the crude opium is necessarily freed from its impurities, while it added considerably to the expense, and as the purified opium itself is variable in strength. It appears from Mr. Phillips' experiments, however, that much more of the purified opium is dissolved than of the crude; but whether the power of the tincture is increased in proportion is uncertain.

Laudanum, as this tincture is named, is given in all those cases in which opium is usually administered, and is preferred to it as being more speedy in its operation, more manageable in its dose, and more convenient for combination with other remedies. Formerly laudanum was prepared with an addition of aromatics,—an addition probably useful in obviating nausea, or even the subsequent debilitating operation on the stomach. In prescribing it, an aromatic tincture may be advantageously combined with it. It is in general proper to avoid combining laudanum directly with the alkalis or alkaline carbonates, as the morphia may either be precipitated, or may enter into new combinations. Acids, on the contrary, are compatible with it, and by increasing the solubility of the morphia, even favour its action.

TINCTURA OPII CAMPHORATA, *vulgo Elixir Paregoricum Anglorum.* Camphorated Tincture of Opium, or Paregoric Elixir. Ed.

"Take of Camphor, two scruples; Benzoic Acid, Opium, of each a drachm; Diluted Alcohol, two pounds and a half. Digest for seven days, and strain through paper."

TINCTURA CAMPHORÆ COMPOSITA. Compound Tincture of Camphor. Lond.

"Take of Camphor, two scruples; Hard Opium in powder, Benzoic Acid, of each one drachm; Proof-spirit, two pints. Macerate for fourteen days, and strain."

TINCTURA OPII CAMPHORATA; *sive Elixir Paregoricum.* Camphorated Tincture of Opium, or Paregoric Elixir. Dub.

"Take of Turkey Opium in powder, Benzoic Acid, of each a drachm; Camphor, two scruples; Essential Oil of Anise, a drachm; Proof-spirit, two pints. Macerate for fourteen days, and strain."

THIS is the tincture known under the name of Paregoric Elixir, which has been long in use as a mild opiate in catarrh and asthma. Half an ounce of it contains a grain of opium, and its usual dose is two tea-spoonfuls, taken at bed-time. It is inferior in strength to the tincture which has a place in the Edinburgh Pharmacopœia, under the same popular name of Paregoric Elixir, the Ammoniated Tincture of Opium, but it is less pungent, and is hence frequently preferred to the other. The London College have given it its present name, rather than the former one of Tinctura Opii Camphorata, to lessen the risk of its being confounded with Tincture of Opium in prescribing it; and they have omitted the Oil of Anise, the odour of which is rather ungrateful. Dr. Montgomery states, however, that this oil (which the Dublin College retains) prevents griping pain in the bowels, which the tincture without it occasions in young children.

TINCTURA QUASSIÆ EXCELSÆ. Tincture of Quassia. Ed.

"Take of Shavings of Quassia, one ounce; Diluted Alcohol, two pounds and a half. Digest for seven days, and strain through paper."

TINCTURA QUASSIÆ. Tincture of Quassia. Dub.

"Take of the Raspings of Quassia Wood, one ounce; Proof-spirit, two pints. Macerate for seven days, then strain."

THE intense bitterness of Quassia may be sufficiently extracted in this preparation. These bitter tinctures appear, however, to be unnecessarily multiplied in the Pharmacopœias, especially as, from the action of the menstruum on the stomach, the form of tincture is not so good as that of infusion for the administration of this class of remedies.

TINCTURA RHEI. Tincture of Rhubarb. Ed.

"Take of Russian Rhubarb cut, three ounces; Lesser Cardamom Seeds bruised, half an ounce; Diluted Alcohol, two pounds and a half. Digest for seven days, and strain through paper."

TINCTURA RHEI. Tincture of Rhubarb. Lond.

"Take of Rhubarb Root cut, two ounces; Cardamom Seeds bruised, half an ounce; Saffron, two drachms; Proof-spirit, two pints. Macerate fourteen days with a gentle heat, and strain."

PROOF-SPIRIT extracts nearly all the active matter of rhubarb, and this tincture therefore has all its powers. It is sometimes prescribed in dyspeptic affections and in diarrhœa, in a dose from half an ounce to an ounce.

TINCTURA RHEI ET ALOES. Tincture of Rhubarb with Aloes. Ed.

"Take of Russian Rhubarb cut, ten drachms; Socotorine Aloes, six drachms in powder; Lesser Cardamom Seeds bruised, half an ounce; Diluted Alcohol, two pounds and a half. Digest for seven days, and strain through paper."

THE cathartic power of the rhubarb is in this tincture increased by combination with the aloes. It is employed as a stimulating aperient and purgative, in a dose from half an ounce to an ounce, frequently also as an emmenagogue.

TINCTURA RHEI ET GENTIANÆ. Tincture of Rhubarb with Gentian. Ed.

"Take of Russian Rhubarb in slices, two ounces; Gentian Root cut, half an ounce; Diluted Alcohol, two pounds and a half. Digest for seven days, and strain through paper."

THIS combination of gentian with rhubarb is supposed to render it a more useful remedy in dyspeptic cases; but the power of the one is so inconsiderable, compared with that of the other, that no important advantage is gained from it. Its dose is from two to four drachms.

TINCTURA SAPONIS CAMPHORATA, *vulgo Linimentum Saponaceum.* Camphorated Tincture of Soap, or Saponaceous Liniment. Ed.

"Take of Hard Soap in shavings, four ounces; Camphor, two ounces; Volatile Oil of Rosemary, half an ounce; Strong Alcohol, two pounds. Digest the soap with the alcohol for three days, then strain and add the camphor and volatile oil, frequently shaking.

LINIMENTUM SAPONIS COMPOSITUM. Compound Soap Liniment. Lond. LINIMENTUM SAPONIS. Dub.

"Take of Hard Soap, three ounces; Camphor, one ounce; Spirit of Rosemary, one pint. Digest the camphor in the spirit, then add the soap, and macerate in a sand-bath until it be dissolved. (Digest the soap in the spirit of rosemary, and add the camphor. Dub.")

TINCTURA SAPONIS ET OPII, *vulgo Linimentum Anodynum.* Tincture of Soap with Opium; commonly called Anodyne Liniment. Ed.

"Take of the Shavings of Hard Soap, four ounces; Opium, one ounce; Camphor, two ounces; Volatile Oil of Rosemary, half an ounce; Strong Alcohol, two pounds. Digest the soap and opium in the alcohol for three days, then strain the liquid, and add the camphor and oil to it, frequently shaking."

LINIMENTUM SAPONIS CUM OPIO, *vel Linimentum Anod.* Dub.

"Take of Soap Liniment by measure, four parts; Tincture of Opium, three parts. Mix."

THESE are stimulants of considerable efficacy, and are in common use as an external application, by friction, in strains and rheumatic pains. The anodyne liniment is, from the addition of opium, the most powerful in relieving rheumatism and spasms of the muscles. It is frequently successful in alleviating local pain, though the relief is often but temporary.

TINCTURA SCILLÆ MARITIMÆ. Tincture of Squill. Ed.

"Take of the fresh Dried Root of Squill, two ounces; Diluted Alcohol, sixteen ounces. Digest for seven days, and strain through paper."

TINCTURA SCILLÆ. Tincture of Squill. Lond.

"Take of Squill Root recently dried, four ounces; Proof-spirit, two pints. Macerate for fourteen days, and strain."

TINCTURA SCILLÆ. Tincture of Squill. Dub.

"Take of the Bulb of Squill recently dried, four ounces; Proof-spirit, two pints. Macerate for seven days, then put aside, and when the impurities have subsided, pour off the pure liquor."

SQUILL, when employed as a diuretic, operates most effectually in substance: as an emetic or expectorant it is usually given under the form of the vinegar or syrup. It is not apparent what particular advantage is to be derived from a tincture of it,—a preparation in which the acrimony of the squill must be very imperfectly covered. The dose of this tincture is from twenty to sixty drops. Mr. Brande says it relieves hoarseness.

TINCTURA SENNÆ COMPOSITA. Tincture of Senna. Ed.

"Take of the Leaves of Senna, two ounces; Root of Jalap bruised, one ounce; Coriander Seeds bruised, half an ounce; Diluted Alcohol, three pounds and a half. Digest for seven days, and to the tincture strained through paper add four ounces of refined sugar."

TINCTURA SENNÆ. Tincture of Senna. Lond.

"Take of the Leaves of Senna, three ounces; Caraway Seeds bruised, three drachms; Cardamom Seeds bruised, one drachm; Raisins freed from the stones, four ounces; Proof-spirit, two pints. Macerate for fourteen days, and strain."

TINCTURA SENNÆ COMPOSITA. Tincture of Senna. Dub.

"Take of the Leaves of Senna, a pound; Caraway Seeds bruised, an ounce and a half; Cardamom Seeds, freed from their capsules and bruised, half an ounce; Proof-spirit, a gallon. Macerate fourteen days, and strain."

THIS forms a very excellent purgative tincture, less unpleasant in its taste than any of the other cathartic tinctures, not liable therefore to excite nausea, and at the same time operating with sufficient effect. Liquorice is a good substitute for the raisins. Its dose is one ounce or ten drachms. In the London and Dublin Pharmacopœias, being prepared without the jalap, it is less active.

TINCTURA TOLUIFERÆ BALSAMI. Tincture of Tolu Balsam. Ed.

"Take of Balsam of Tolu, one ounce and a half; Strong Alcohol, one pound. Digest until the balsam is dissolved, and strain through paper."

TINCTURA BALSAMI TOLUTANI. Tincture of Balsam of Tolu. Dub.

"Take of Tolu Balsam, an ounce; Rectified Spirit, a pint. Digest in a close vessel until the balsam is dissolved, then strain."

THE tolu balsam is soluble in alcohol; but, as it is a substance of no activity, this tincture is scarcely used but on account of its fla-

vour, and for making the syrup of tolu according to the formula of the Edinburgh Pharmacopœia.

Tinctura veratri albi. Tincture of White Hellebore. Ed.

"Take of White Hellebore root bruised, four ounces; Diluted Alcohol, sixteen ounces. Digest for seven days, and strain through paper."

White hellebore is a medicine scarcely ever prescribed internally, its operation is so violent, from the energetic principle which it contains, *Veratria*. As this tincture contains a considerable portion of veratria, its dose cannot exceed a few drops; if a larger quantity be given, it acts violently as an emetic or cathartic.

The following Tinctures are peculiar to the London and Dublin Pharmacopœias.

Tinctura aurantii. Tincture of Orange-peel. Lond.

"Take of Fresh Orange-peel, three ounces; Proof-spirit, two pints. Digest for fourteen days, and strain."

Tinctura aurantii. Tincture of Orange-peel. Dub.

"Take of Fresh Orange-peel, three ounces; Proof-spirit, two pints. Digest for three days, and strain."

The alcohol is in this tincture impregnated with the flavour and bitterness of the orange-peel, and it may be used as communicating flavour, or in combination with more powerful bitters. If made with dried orange-peel, the flavour is much stronger.

Tinctura capsici. Tincture of Capsicum. Lond. Dub.

"Take of Capsicum Berries, an ounce; Proof-spirit, two pints. Macerate for fourteen days, and strain."

Under this form capsicum is employed as a stimulant and stomachic; and diluted it affords an easy mode of forming the capsicum gargle, which is employed in some forms of cynanche, half an ounce being added to eight ounces of water.

Tinctura cardamomi composita. Compound Tincture of Cardamom. Lond.

"Take of Cardamom Seeds, Caraway Seeds, Cochineal, of each beat to powder, two drachms; Cinnamon Bark bruised, half an ounce; Raisins freed from the stones, four ounces; Proof-spirit, two pints. Macerate for fourteen days, and strain."

Tinctura cardamomi composita. Compound Tincture of Cardamom. Dub.

"Take of Lesser Cardamom Seeds freed from their capsules, and bruised, Caraway Seeds bruised, of each two drachms; Cinnamon Bark bruised, half an ounce; Proof-spirit, two pints. Macerate for fourteen days, then strain."

This tincture may be employed as a grateful aromatic and carminative. It is often added to bitter infusions; it is frequently also employed to colour other remedies, as where a long-continued course of any medicine is prescribed, it is often required to make some

slight change in its appearance. For this latter purpose the Dublin tincture is not adapted, since the College has omitted the cochineal as expensive and useless in point of efficacy. The two tinctures also differ in the one being sweet and the other not.

Tinctura rhei composita. Compound Tincture of Rhubarb Lond.

"Take of Root of Rhubarb cut, two ounces; Liquorice Root bruised, half an ounce; Ginger Root cut, Saffron, of each two drachms; Proof-spirit, a pint; Water, twelve fluid-ounces. Macerate for fourteen days, and strain."

Tinctura rhei composita. Compound Tincture of Rhubarb. Dub.

"Take of Rhubarb Root cut, two ounces; Cardamom Seeds bruised and husked, Liquorice Root bruised, of each half an ounce; Saffron, two drachms; Proof-spirit, two pints. Macerate for seven days, and strain."

The principle in which the purgative quality of rhubarb resides has been supposed to be more completely dissolved by water than by other solvents; hence a larger proportion of water is prescribed in the formula for this tincture than usual, and the quantity of alcohol is little more than is necessary to prevent spontaneous decomposition. Its medium dose as a purgative is an ounce.

Tinctura valerianæ. Tincture of Valerian. Lond. Dub.

"Take of Valerian Root, four ounces; Proof-spirit, two pints. Macerate for fourteen (seven, Dub.) days, and strain."

The active matter of valerian is sufficiently extracted by diluted alcohol; but the powers of the menstruum probably exceed those of the dissolved matter, and hence this tincture cannot be employed with advantage. It is sometimes given with the addition of a few drops of tincture of assafœtida. Its action is an antispasmodic in hysteric disorders, but it is much inferior in utility to the root itself, exhibited in the form of powder or bolus.

Tinctura buchu. Tincture of Buchu. Dub.

"Take of Buchu Leaves, two ounces; Proof-spirit, a pint. Macerate for seven days, and strain."

A dark coloured tincture, used as a diaphoretic, diuretic and stimulating embrocation, (p. 222.) The dose is from one drachm to four; it is sometimes added to the infusion of buchu.

Tinctura seminum colchici. Tincture of Meadow Saffron Seeds. Dub.

"Take of the Seeds of the Meadow Saffron, two ounces; Proof-spirit, a pint. Macerate for fourteen days, and strain."

The seeds of colchicum vary less in their medicinal power than the other parts of the plant, hence this tincture is more uniform in its activity than other preparations from the plant; it is said also to be less apt to occasion nausea and purging. The seeds should be gathered in July, and carefully dried, but not bruised, as the veratria exists chiefly in the husk. The dose of the tincture is from ten to sixty drops, given chiefly in gout. (See page 222.)

Tinctura galbani. Tincture of Galbanum. Dub.

"Take of Galbanum cut into small pieces, two ounces; Proof-spirit, two pints. Digest for seven days, and strain."

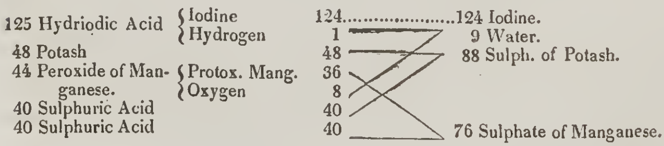
This tincture has sometimes been used as less nauseous than that of assafœtida in hysteria, and to obviate flatulence in a dose of two or three drachms. It can scarcely be supposed to have any power.

Tinctura iodinii. Tincture of Iodine. Dub.

"Take of Iodine, two scruples; Rectified Spirit, one ounce. Mix and dissolve the iodine by heat; keep the mixture in a well-closed vessel."

Preparations of iodine are now introduced into the Dublin Pharmacopœia, and will probably be admitted by the other Colleges, as in its peculiar action on the absorbents it is much superior to any other remedy we possess.

Iodine, it has been already stated, (p. 16.), is a simple substance, having much analogy to chlorine. It was discovered in 1812 by M. Courtois, a manufacturer of saltpetre in Paris. It exists in the waters of the ocean, from which it is abstracted by marine plants; and from the ashes of those known by the names of Kelp and Barilla it is obtained. It exists in kelp in the state of an acid, the hydriodic, combined with potash. The usual process for procuring it is to take what is named soap-makers' ley, which is a solution of kelp, from which greater part of the alkali has been abstracted, heat it to 230°, and mix it with a fourth part of its bulk of sulphuric acid, diluted with an equal quantity of water; the liquor is filtered and heated in a glass retort with black oxide of manganese, in the proportion of 80 grains to each ounce, by measure, of the fluid. Iodine will appear in the form of a purple vapour, and will condense in scales in the neck of the retort. In this process the hydriodate of potash which exists in the ley is decomposed by the sulphuric acid, hydriodic acid is evolved, which, in its nascent state, is acted on by the oxide of manganese, the oxygen taking its hydrogen to form water, and the iodine being disengaged. This reaction is shewn in the following diagram:




To purify the iodine, it must be washed, mixed with a little water and the 500th part of its weight of potash, and again distilled. It must be kept in bottles with glass stoppers.

Iodine crystallizes in tables of a dark colour and shining lustre, friable and nearly five times heavier than water. Its taste is acrid and pungent, and it stains the skin of an orange colour. It is sparingly soluble in water, requiring 7000 parts for solution; it is much more soluble in alcohol, hence the form of tincture is well suited to it. It is sometimes adulterated with oxide of manganese and char-

coal; but these substances do not pass into the tincture, which is only rendered so much weaker by the deficient quantity of iodine. Each drachm of the above tincture contains five grains of iodine. Its dose is ten drops (which contain about half a grain) given in any viscid liquid three times a-day. These doses may be gradually increased to twenty drops. The tincture should not be kept long, as it is liable to deposite part of the iodine, or to have it changed into hydriodic acid.

The medicinal use of iodine was first introduced by Dr. Coindet of Geneva. He remarked, that burnt sponge formed the basis of all the remedies that had been used with success in the treatment of goitre, and drew the inference that it was the iodine which is known to exist in sponge which was the efficient remedy. He accordingly employed preparations of iodine in cases of goitre, and with success. It would appear that the action of iodine is peculiarly directed to the thyroid gland; and in diseases of that gland, particularly that most obstinate one of goitre, there is no other substance approaching to it in utility. But it is also a general stimulant of the absorbents, and is hence serviceable in other glandular enlargements, as swelled testicle, bronchocele, enlargement of the liver, spleen, mammæ; likewise in scrofula, in ascites, and ovarian dropsy. It has been supposed to be beneficial in tuberculous phthisis, particularly if the vapour of it be inhaled, and in chorea. Its claim to be regarded as an emmenagogue is doubtful. If the administration of the iodine be too long continued, it produces much derangement of the system, great anxiety and depression of spirits, palpitation, a nervous tremor resembling chorea, and emaciation to an alarming degree. When these injurious effects begin to appear, its use should be intermitted. To relieve the symptoms, bark, opium, prussic acid, ammonia are recommended, and the use of the warm-bath.

The tincture of iodine is employed externally as a liniment, combined with from four to eight parts of soap liniment, or anodyne liniment, to be rubbed on the diseased glands. Other forms of iodine which are in use are the hydriodate of potash and iodine ointment.

TINCTURA MOSCHI. Tincture of Musk. Dub.

"Take of Musk in powder, two drachms; Rectified Spirit, one pint. Digest for seven days, and strain."

THE form of tincture is not one in which the antispasmodic virtue of musk can be properly exerted; it has nothing but the odour of that substance.

TINCTURA NUCIS VOMICÆ. Tincture of Nux Vomica. Dub.

"Take of Nux Vomica rasped, two ounces; Rectified Spirit, eight ounces. Macerate for seven days, and strain."

THIS tincture, lately introduced into the Dublin Pharmacopœia, is a form of administering nux vomica, which has the advantage of being uniform, and appears to be sufficiently active; the only objection to it is, that the intense bitterness of strychnia is more perceptible when it is in solution than where the powdered nut or extract is given. The application of nux vomica to the cure of paralysis

depending on the spinal marrow has been already stated, (p. 96). This tincture is given in a dose of from five drops to twenty, and may also be applied by friction to the paralyzed part.

TINCTURA PIPERIS CUBEBÆ. Tincture of Cubebs. Dub.

"Take of Cubebs Pepper, four ounces; Proof-spirit, two ounces. Macerate for fourteen days, and strain."

THE power of cubebs of curing gonorrhœa has been already adverted to, (p. 147). The powder of cubebs is usually employed, but this tincture is likewise very effectual. It gives to the urine the peculiar smell of cubebs. It is apt when freely used to produce severe deep-seated headach. It was said to have some tendency to excite hernia humoralis, and this has been confirmed by Dr. Traill. It was found by him to be a more useful remedy in old and obstinate blenorrhœa, than in the early stages of gonorrhœa. Dr. Stephenson states, that it sometimes produces distressing hæmorrhoids and urticaria. The tincture is used also as a carminative to improve the appetite and digestion.

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## CHAP. XV.

### TINCTURÆ AMMONIATÆ—AMMONIATED OR VOLATILE TINCTURES.

THE character of Ammonia being so very marked, and its action on the animal system so powerful, the Edinburgh College have appropriated a separate chapter to the consideration of those tinctures, in the composition of which it forms a principal ingredient. They are all highly pungent and stimulating, and often produce diaphoresis. They are incompatible with acids, acidulous salts, and most metallic and earthy salts, which produce double decompositions, neutralize the ammonia, and precipitate whatever vegetable matter it holds dissolved.

TINCTURA AROMATICA AMMONIATA. Ammoniated Aromatic Tincture. Ed.

"Take of Ammoniated Alcohol, eight ounces; Volatile Oil of Lemon-peel, one drachm; Volatile Oil of Rosemary, one drachm and a half. Mix, so as to dissolve the oils."

SPIRITUS AMMONIÆ AROMATICUS. Aromatic Spirit of Ammonia. Lond.

"Take of Cinnamon Bark bruised, Cloves bruised, of each two drachms; Lemon Rind, four ounces; Sub-carbonate of Potash, half a pound; Muriate of Ammonia, five ounces; Rectified Spirit, four pints; Water, a gallon. Mix, and distil six pints."

SPIRITUS AMMONIÆ AROMATICUS. Aromatic Spirit of Ammonia. Dub.

"Take of Spirit of Ammonia, two pints; Essential Oil of Lemon,

two drachms; Nutmegs bruised, half an ounce; Cinnamon Bark bruised, three drachms. Digest in a close vessel for three days, occasionally agitating, and distil a pint and a half."

These formulas are different from each other, but the product is nearly the same in them all. If the oils are pure, which, however, according to Mr. Phillips, they seldom are, and the alkali in the caustic state, the process of the Edinburgh College answers perfectly well; but otherwise it is necessary to distil off the tincture to procure it clear and colourless, and properly impregnated with the oils. In the London process, the ammonia is evolved by the sub-carbonate of potash, and muriate of ammonia, decomposing one another; muriate of potash is formed, and the ammonia, combined with a portion of carbonic acid, unites with the oils. This formula is, however, incorrect, as Mr. Phillips has pointed out, in the quantity of sub-carbonate of potash, which is much too small to decompose the whole of the sal-ammoniac. It should be at least eight ounces instead of six.

By this combination of ammonia with alcohol, and the addition of the aromatic oils, a preparation is obtained more grateful than spirit of ammonia. It is therefore often used in preference to the other, as a stimulant in languor and faintness, or to relieve flatulence, and sometimes as an antacid. Its dose is from fifteen to thirty drops.

Tinctura assafœtidæ ammoniata. Ammoniated Tincture of Assafœtida. Ed.

"Take of Assafœtida, half an ounce; Ammoniated Alcohol, eight ounces. Digest in a close vessel for twelve hours, then distil, by the heat of boiling water, eight ounces."

Spiritus ammoniæ fœtidus. Fetid Spirit of Ammonia. Lond.

"Take of Spirit of Ammonia, two pints; Assafœtida, two ounces. Macerate for twelve hours, and distil, with a slow fire, into a cooled receiver, a pint and a half."

Spiritus ammoniæ fœtidus. Fetid Spirit of Ammonia. Dub.

"Take of Spirit of Ammonia, two pints; Assafœtida, an ounce and a quarter. Macerate in a close vessel for three days, occasionally shaking; pour off the clear liquor, and distil a pint and a half."

The impregnation of the ammoniated alcohol, with part of the assafœtida in this process, though it may communicate a fetid smell, can add little to its activity; accordingly, though it has a place in all the Pharmacopœias, it is seldom found in the shops. It has been given in hysteria in a dose of thirty drops. An extemporaneous combination of spirit of ammonia and tincture of assafœtida is considered by Mr. Brande as a preferable preparation.

Tinctura castorei composita. Compound Tincture of Castor. Ed.

"Take of Castor in powder, an ounce; Assafœtida, half an ounce; Ammoniated Alcohol, one pound. Digest for seven days, and strain through paper."

This is a very active preparation, and is given with advantage

in hysteria, flatulent colic, cramp of the stomach, &c. in doses from one to two drachms. The castor contributes little to its efficacy.

TINCTURA GUAJACI AMMONIATA. Ammoniated Tincture of Guaiac. Ed.

"Take of the Resin of Guaiac, four ounces; Ammoniated Alcohol, one pound and a half. Digest for seven days, and strain through paper."

TINCTURA GUAJACI AMMONIATA. Ammoniated Tincture of Guaiac. Lond. Dub.

"Take of the Gum-Resin of Guaiac in powder, four ounces; Aromatic Spirit of Ammonia, a pint and a half. Macerate for fourteen (seven, Dub.) days, and strain."

As the ammonia coincides with the guaiac as a stimulant and diaphoretic, this affords a preparation of more efficacy than the simple tincture, and it is more frequently employed. It is given in chronic rheumatism, in a dose of from one to two drachms. Like the simple tincture, it is decomposed by water, which precipitates the resin in a curdy form; it must therefore be taken in mucilage, honey or milk, or mixed with the yolk of an egg.

TINCTURA OPII AMMONIATA, *olim Elixir Paregoricum.* Ammoniated Tincture of Opium, formerly Paregoric Elixir. Ed.

"Take of Opium, two drachms; Saffron, sliced, Benzoic Acid, of each three drachms; Volatile Oil of Anise, half a drachm; Ammoniated Alcohol, sixteen ounces. Digest for seven days, and strain through paper."

THIS formula is designed as an improved form of Paregoric Elixir, a remedy which has been much used as a mild and pleasant opiate, particularly in catarrh, (p. 357). The formula, however, is but ill contrived. While the ammonia can add little to the efficacy of the preparation, its pungency renders it ungrateful, and the tincture approaches too nearly in strength to the common tincture of opium. The Paregoric Elixir of the other Colleges, (Tinct. opii camphorata,) is better adapted to the purposes for which it is designed; they are commonly distinguished by the names of English and Scotch Paregoric, the latter being the present preparation. The common application of it is, as a remedy in catarrhal affections, and in some spasmodic disorders, as chincough, the ammonia apparently, in some degree, removing the spasm, while the opium tends to prevent its return. Its dose is from half a drachm to a drachm, taken generally at bed-time.

TINCTURA VALERIANÆ AMMONIATA. Ammoniated Tincture of Valerian. Ed. Dub.

"Take of Valerian Root bruised, four (two, Dub.) ounces; Ammoniated Alcohol, two pounds and a half, (a pint. Macerate, Dub.) Digest for seven days, and strain through paper."

TINCTURA VALERIANÆ AMMONIATA. Ammoniated Tincture of Valerian. Lond.

"Take of Valerian Root, four ounces; Aromatic Spirit of Ammonia, two pints. Macerate for fourteen days, and strain."

This tincture is more powerful than the simple tincture, from the impregnation of ammonia. It is given in hysteria, in a dose of from one to two drachms.

Spiritus ammoniæ succinatus. Succinated Spirit of Ammonia. Lond.

"Take of Mastich, three drachms; Rectified Spirit, nine fluid-drachms; Oil of Lavender, fourteen minims; Oil of Amber, four minims; Water of Ammonia, ten fluid-ounces. Macerate the mastich in the spirit, so that it may be dissolved, and pour off the clear solution; add to this the other ingredients, and mix them all by agitation."

A composition, supposed to consist of spirit of ammonia, impregnated with oil of amber and some other essential oils, has been in use as a stimulating perfume under the name of Eau de Luce. A preparation was introduced into the London Pharmacopœia as a substitute for this, which had not, however, its usual milky appearance. This is given in the present formula by the addition of the mastich, the resinous matter of which is separated by the water, but is retained in a state of suspension, probably by the action of the alkali. According to Mr. Phillips, however, the original Eau de Luce contains no oil of amber, and this composition would be more agreeable without the odour of that oil. It is considered as a good analeptic remedy, and is given in the same doses as the spirit of ammonia. In India it has been found, from its stimulating powers, to be a useful remedy in cases of bites from poisonous snakes.

Tinctura cinchonæ ammoniata. Ammoniated Tincture of Bark. Lond.

"Take of Lance-leaved Peruvian Bark bruised, four ounces; Aromatic Spirit of Ammonia, two pints. Macerate for ten days, and strain."

A tincture similar to this had formerly a place in the London Pharmacopœia, but was expunged: it is not obvious on what grounds it is restored; for there seems to be little propriety in employing spirit of ammonia as a menstruum of bark, as they scarcely coincide in any important virtue, and the activity of the ammonia must be much superior to that of the quantity of bark dissolved. In fact, it is scarcely different from ammoniated alcohol.

Spiritus colchici ammoniatus. Ammoniated Spirit of Colchicum. Lond.

"Take of Meadow Saffron Seeds, bruised, two ounces; Aromatic Spirit of Ammonia, one pint. Macerate for fourteen days, and strain."

This is a new preparation of colchicum, introduced into the London Pharmacopœia since the employment of this plant, in one form or another, as a specific in gout, has become general. Like the simple tincture of the Dublin Pharmacopœia, it is prepared from the seeds, which have some advantages (p. 361). The ammonia is added, probably to act as a diffusible stimulus, and in some measure to

correct the narcotic effect of the colchicum. In most cases the simple tincture is preferable, and, if it be desired, it is easy to add ammonia. The spirit is used as a diuretic and anodyne; its dose is half a drachm or a drachm.

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# CHAP. XVI.

## ÆTHEREA—ETHER, AND ETHEREAL SPIRITS.

Acidum sulphuricum aromaticum. Aromatic Sulphuric Acid. Ed. Dub.

"Take of Alcohol, two pounds, (two pints, Dub.); Sulphuric Acid, six ounces, (by weight). Drop the acid gradually into the alcohol. Digest the mixture with a very gentle heat, in a close vessel, for three days, then add of Bark of Cinnamon bruised, one ounce and a half; of Ginger bruised, one ounce. Digest again in a close vessel for six days; then strain through paper placed in a glass funnel."

The dilution of the acid by the alcohol, in the proportions in which they are mixed in this preparation, is such, that little chemical action appears to be exerted during the digestion; an odour somewhat peculiar is acquired, but the acidity is little impaired. The aromatics render it more pleasant, and the preparation may be considered, therefore, as a grateful one for the exhibition of sulphuric acid. Its dose is thirty drops given in a cupful of water. It is not unfrequently used in dyspepsia, hæmoptysis, and other diseases in which this acid is employed, and benefit is often derived from it, when bitters and aromatics have been found of no utility. It is sometimes given in conjunction with cinchona and other tonic barks, a combination which is found to be extremely useful, probably from the acid rendering the alkaloids, cinchonia and quinia, more soluble, and consequently more active.

Æther sulphuricus. Sulphuric Ether. Ed.

"Take of Sulphuric Acid, Strong Alcohol, of each thirty-two ounces. Pour the alcohol into a glass retort, capable of bearing a sudden heat. Then pour on the acid in an uninterrupted stream. Mix them gradually by frequent and gentle agitation; then immediately distil from a sand-bath, previously heated for this purpose, into a receiver kept cool with water or snow. Let the heat be regulated in such a manner, that the liquor may be made to boil as soon as possible, and continue to boil until sixteen ounces have distilled over; then remove the retort from the sand. To the distilled liquor add two drachms of potash, and distil again from a high-necked retort, with a very gentle heat, into a receiver kept cool, until ten ounces have passed over. If to the acid remaining in the retort, after the first distillation, sixteen ounces of strong alcohol be

added, and the distillation be repeated, ether will again be produced. And this may be often repeated."

ÆTHER SULPHURICUS. Sulphuric Ether. Lond.

"Take of Rectified Spirit, Sulphuric Acid, of each, by weight, a pound and a half. Pour the spirit into a glass retort, and add to it gradually the acid, shaking frequently, and taking care that the heat do not rise higher than 120°, until they are mixed together. Then place the retort cautiously in a sand-bath, previously heated to 200°, that the liquor may boil as quickly as possible, and let the ether pass into a tubulated receiver, to which another is adapted, kept cool by ice or water. Distil the liquor until a heavier portion begin to pass over, which will be observed beneath the ether at the bottom of the receiver. To the liquor which remains in the retort, add again twelve ounces of Rectified Spirit, so that ether may distil in a similar manner."

ETHER RECTIFICATUS. Rectified Ether. Lond.

"Take of Sulphuric Ether, fourteen fluid-ounces; Fused Potash, half an ounce; Distilled Water, eleven fluid-ounces. Dissolve first the potash in two fluid-ounces of the water, and add to it the ether, shaking thoroughly, until they are mixed; then distil twelve ounces of ether with a heat of about 120°, from a large retort into a vessel kept cold; then shake this distilled fluid with nine fluid-ounces of water, and put it aside that the water may subside. Lastly, pour off the supernatant Rectified ether, and keep it in a well-stopped vessel."

LIQUOR ÆTHEREUS SULPHURICUS. Sulphuric Ethereal Liquor. Dub.

"Take of Rectified Spirit, Sulphuric Acid, of each thirty-two ounces by weight. Pour the spirit into a retort capable of bearing a sudden heat, and pour upon it the acid in a continued stream. Mix them gradually and distil, with a heat sufficiently strong and quickly raised, twenty ounces of liquor by measure into a receiver kept cool. If to the acid remaining in the retort sixteen ounces of rectified spirit are added, sulphuric ethereal liquor will again be obtained by distillation."

ÆTHER SULPHURICUS. Sulphuric Ether. Dub.

"Take of Sulphuric Ethereal Liquor, twenty ounces by measure; Carbonate of Potash, dry and in powder, two drachms. Mix them, and distil twelve ounces by measure from a high-necked retort, with a very gentle heat, into a receiver kept cold. The specific gravity of this liquid is to that of distilled water as 765 to 1000."

THE directions in the Pharmacopœias for conducting this process are nearly the same. The principal peculiarity in the formula of the London Pharmacopœia, is that of adding the acid gradually to the spirit, agitating the mixture after each addition; but on account of the rise of temperature as the mixture proceeds, this is more difficult than the mode directed by the Edinburgh College, of mixing the whole acid and alcohol at once, and any loss of ethereal vapour, from the sudden action produced by the mixture in the latter mode, is very trivial.

On mixing equal weights of sulphuric acid and alcohol, a mutual

action, marked by an elevation of temperature and change of colour, is produced, and a vapour is disengaged, of an ethereal smell. On raising the temperature by the application of heat, so as to cause the mixed liquid to boil, ether is formed, and distils over, along with a portion of alcohol. This continues for a considerable time; towards the end of this stage of the process the liquid in the retort becomes capable of sustaining a higher temperature, and along with the ether there are produced white vapours, which condense into a dense oily-like fluid at the bottom of the receiver; this fluid is named Oil of Wine, or Ethereal Oil. While it is condensing, a quantity of olefiant gas is formed, and such a quantity of carbonaceous matter is separated from the alcohol, that the liquor becomes of a deep brown colour. If the heat be continued beyond this there is a sudden and copious production of sulphuric acid gas, which, not escaping easily from the heavy liquor in the retort, causes it to swell up, and if not removed from the fire, it will pass over into the receiver. The principal difficulty, therefore, in conducting the process, is to continue the distillation, so as to obtain the largest produce of ether, without bringing over the liquor from the retort. The rule given in the Edinburgh Pharmacopœia is to continue it until the liquor condensed in the receiver is equal to half the quantity of alcohol that had been employed; as when this has been obtained, the formation of ether will have nearly ceased; this however is not easily ascertained with accuracy. The London College directs the distillation to be continued until the heavier fluid or solution of sulphurous acid appears; and if care be taken to guard against the sudden swelling up of the liquor in the retort, this may be done, and rather a larger product obtained. The most simple rule is, that whenever the neck of the retort becomes obscured with white vapours, the fire should be withdrawn; and if the materials begin to swell, the retort ought to be raised in the sand. The receiver requires to be kept cool by immersion in water, or causing water to trickle over it, in order to promote the condensation of the ether; it should be luted to the retort with paste of flour and water, spread on slips of linen; and care ought to be taken to avoid approaching a burning body to the apparatus, as accidents have sometimes happened, when the vessels were not closely luted, from the volatility and inflammability of the ethereal vapour. There is some difference of opinion with regard to the degree of heat that should be employed in the distillation. According to Mr. Brande, if it is attempted to distil ether at the temperature of 212°, or even 220°, very little else than alcohol passes over: a temperature of from 250° to 280° he considers necessary for the production of ether in large quantity. At Apothecaries' Hall, accordingly, he informs us, the mixture of alcohol and acid is heated by the transmission of steam formed under high pressure, and, therefore, thirty or forty degrees above the boiling temperature. In this way the mixture is rapidly heated to the boiling point, and a larger proportion of ether obtained than by any other process, while the risk of fire is avoided, the steam being brought from a boiler in another room. Mr. Phillips, however, states from his experiments, that when the distillation was performed quickly, as in three hours, the

ether obtained was weak, its specific gravity not being less than 0.791; but when the distillation was slow, occupying for the same quantity of product nine hours, the ether produced had a specific gravity of 0.782. He found the strongest ether to be formed generally in the middle of the process; from 16 ounces of alcohol of the specific gravity 0.830, and the same quantity of sulphuric acid of specific gravity 1.837, he procured twelve ounces of product, of which 4 were impure ether of sp. gr. 0.779, the next 4 ounces were of sp. gr. 0.753, then $2\frac{1}{2}$ of ether mixed with sulphurous acid, forming a yellow fluid of sp. gr. 0.784; and, lastly, $1\frac{1}{2}$ of heavy liquid of sp. gr. 0.981.

After the distillation is completed, if, as the Colleges direct, half the original quantity of alcohol be added to the acid liquor in the retort, and heat again applied, an additional portion of ether is obtained. As the sulphuric acid is much weakened by the first process, the second product contains more water and unaltered alcohol than the first, and from these impurities is necessarily heavier. Still, as both products are to be afterwards rectified, the second process is proper in an economical point of view. The principal change which is effected in the sulphuric acid, appears to be dilution with water, which it abstracts from the composition of the alcohol; there is also formed from it in the process, even at its commencement, a peculiar acid, which has been named the sulphovinic: this consists of one equivalent of sulphuric acid, combined with two of olefiant gas.

The preparation of ether seems, from what is stated by Mr. Brande, to be more advantageously conducted on the large scale. At Apothecaries' Hall, 100 pounds of sulphuric acid, and 100 of alcohol, placed in a cast-iron still, lined with lead, and heated by high-pressure steam conducted into the mixture, afford about 52 pounds of ether, of sp. gr. 0.761, by the first distillation; and 50 pounds of rectified spirit added to the residue give from 46 to 52 pounds more of ether of sp. gr. 0.765. About 100 pounds of impure ether are thus obtained, which, by rectification, are reduced to 55 or 58 pounds of ether of sp. gr. 0.733.

From the different facts which have been mentioned, the theory of the formation of ether is easily deduced. It has been already stated, that ether differs from alcohol solely in containing one proportion less of oxygen, and one less of hydrogen. Alcohol consists of 2 atoms of carbon, with 3 of hydrogen, and 1 of oxygen; or if we take two equivalents of alcohol, there will be 4 atoms of carbon, 6 of hydrogen, and two of oxygen; take away one atom of hydrogen and 1 of oxygen, and we have 4 atoms of carbon, 5 of hydrogen, and one of oxygen, which is the composition of ether. The change from alcohol to ether consists, therefore, in an equivalent of water being subtracted from the alcohol, and this the sulphuric acid, which has a strong affinity to water, aided by the heat, effects.

Ether, as it is obtained by the first distillation, is not pure. It is diluted with a considerable proportion of water; it also contains alcohol, and very generally a portion of sulphurous acid, which had been evolved towards the end of the distillation. To free it from these is the object of the directions for its rectification, which are nearly the

same in the different Pharmacopœias, the product of the first distillation being again distilled from potash, which detains the sulphurous acid and water. The addition of water, ordered in the London Pharmaoopœia, is improper. It is useful in the process of rectification to add a little black oxide of manganese, which yielding oxygen to the sulphurous acid, converts it into sulphuric, and abstracts it more effectully than is done by the alkali alone. The rectified ether has still an intermixture of alcohol, which distilled over it with it. This is removed by washing with water, alcohol having a stronger affinity to water than ether has, whence they are separated. The washing ought to be performed before the distillation from potash, not after it. In the London and Dublin Pharmacopœias, both the Unrectified and Rectified Ether have a place. The Edinburgh College, with more propriety, admit of no distinction, but name the product when rectified, Sulphuric Ether, and sanction its use only in this state.

Sulphuric Ether has a peculiar odour, strong and diffusive, but not pungent; its taste is warm and penetrating; it is colourless and transparent; its specific gravity when highly rectified is so low as .700; it is therefore one of the lightest liquids. In evaporating it absorbs much caloric; hence, if dropt on the hand, it quickly disappears, producing on the spot a sensation of cold; and this affords a good test of its purity, the volatility and cold produced being greater as it is more highly rectified. It is soluble in alcohol in every proportion; in water it dissolves only in the limited proportion of one part to ten; and this affords another test of its proper preparation, as if more soluble it is diluted either with water or alcohol. Its medicinal properties have been already considered, (p. 71.)

Æther sulphuricus cum alcohole. Sulphuric Ether with Alcohol. Ed.

"Take of Sulphuric Ether, one part; Strong Alcohol, two parts. Mix them."

Spiritus ætheris sulphurici. Spirit of Sulphuric Ether. Lond.

"Take of Sulphuric Ether, half a pint; Rectified Spirit, a pint. Mix them."

A preparation which possesses no advantage, and is scarcely ever prescribed.

Æther sulphuricus cum alcohole aromaticus. Aromatic Sulphuric Ether with Alcohol. Ed.

"Take of Cinnamon Bark bruised, Lesser Cardamom Seeds bruised, of each an ounce; Long Pepper, powdered, two drachms; Sulphuric Ether with Alcohol, two pounds and a half. Digest for seven days, and strain through paper."

Spiritus ætheris aromaticus. Aromatic Spirit of Ether. Lond.

"Take of Cinnamon Bark bruised, three drachms; Cardamom Seeds in powder, a drachm and a half; Long Pepper in powder, Ginger Root cut, of each a drachm; Spirit of Sulphuric Ether, a pint. Macerate for fourteen days in a glass vessel closed, and strain."

The addition of these aromatics to the sulphuric ether in this formula is of so little importance, that the preparation is scarcely ever used, and from the quantity of ether imbibed by the materials, is a very uneconomical one.

Oleum æthereum. Ethereal Oil. Lond.

"The liquor remaining after the distillation of sulphuric ether, distil with a very gentle heat, until a black froth swells up; then immediately remove the retort from the fire. To the liquor which remains in the retort add water, so that the oily part may float upon it. Draw this off, and mix it with lime-water, as much as may be sufficient to neutralize the acid which is contained in it, agitating them together. Lastly, withdraw the ethereal oil after it has separated."

Liquor æthereus oleosus. Oily Ethereal Liquor. Dub.

"Take the liquor remaining in the retort after the distillation of sulphuric ether. Distil it with a moderate heat to one half."

The product which it is the object of these processes to obtain is the Oil of Wine, or Ethereal Oil, which, according to Mr. Hennel, consists of an equivalent of sulphuric acid, and four of olefiant gas. It has no acidity, and much resembles an essential oil, presenting the curious fact of a powerful acid being neutralized by olefiant gas. The easiest mode of procuring it is in the distillation of ether, or in the common process for making olefiant gas. The above process of the London Pharmacopœia, according to Mr. Phillips, does not succeed. He could not procure any oil by it, and what he purchased under the name of oil of wine, prepared by the process, was only yellow coloured empyreumatic ether. It is thick, unctuous in appearance, less volatile than ether, and soluble both in it and in alcohol. It is applied to no medicinal use, but in forming the following preparation.

Spiritus ætheris sulphurici compositus. Compound Spirit of Sulphuric Ether. Lond.

"Take of Spirit of Sulphuric Ether, a pint; Ethereal Oil, two fluid-drachms. Mix them."

A composition had been in use under the name of Hoffman's Anodyne Liquor, which consisted of alcohol, with a portion of ether and ethereal oil. This, after having been discarded from the Pharmacopœias, has been restored in the present preparation, on the supposition that it possesses superior powers as an anodyne. It probably differs, however, in nothing from ether with alcohol, at least there is no distinct proof of any peculiarity of operation being communicated by the ethereal oil.

Æther nitrosus. Nitrous Ether. Dub.

"Take of Purified Nitrate of Potash, dried, and in coarse powder, one pound and a half; Sulphuric Acid, one pound; Rectified Spirit, nineteen ounces by measure. Put the nitrate of potash into a tubulated retort, placed in a bath of cold water; and pour upon it gradually, and in small quantities, the sulphuric acid and alcohol, previously mixed and allowed to become cold. Without any external

heat, or with only such a slight degree of it as may be communicated by the addition of a little tepid water to the bath, an ethereal liquor will begin to distil. In a short time the heat in the retort will increase spontaneously, and a considerable ebullition will take place, which must be moderated by adding a portion of cold water to the bath. It is necessary, also, that the receiver should be kept cold with water or snow; and it ought to be furnished with an apparatus adapted to transmit through a pound of rectified spirit, in a phial kept cold, the highly elastic vapour, disengaged suddenly, and with great force, from the mixture, if the heat is raised rather too high. The ethereal liquor thus obtained by spontaneous distillation is to be put into a phial closely stopt with a glass stopper; and to neutralize the excess of acid, as much carbonate of potash, very dry and in powder, is to be added as will suffice to neutralize the acid, using the test of litmus. This is generally attained on the addition of about a drachm of the salt, and in a short time the nitrous ether rises to the surface, and may be withdrawn by a funnel. To obtain the ether in its purest state, distil it again from a water-bath, heated to about 140°, to one half. Its specific gravity is to that of distilled water as 900 to 1000."

The process for preparing nitrous ether has always been found difficult, from the great susceptibility of decomposition of the acid, and the rapidity with which it communicates oxygen to the alcohol. Their mutual action, in consequence of this, becomes extremely violent, and it is difficult to add the requisite proportion of nitric acid to form ether, or to do so at least without considerable waste in the dissipation of elastic products. Different arrangements have been contrived to facilitate this, but probably none that can be conducted more easily than that now received into the Dublin Pharmacopœia, originally contrived by Woolfe, and found by Pelletier to succeed better than any other. The addition of the mixture of sulphuric acid and alcohol should be made in small quantities at a time, not exceeding two ounces; then a very gentle heat is to be applied, and the ether collected in a Woolfe's apparatus. An easier process, and one which may be conducted with equal safety, was employed by Dr. Duncan. It consisted in putting the alcohol into a tubulated retort, and introducing gradually nitrous acid through a long small tubed funnel. Chemical action ensues, which is not violent, and, after it has ceased, heat is cautiously applied, and the nitric ether distils over. It is received in a Woolfe's apparatus, kept cold, the first bottle of which is empty, the second contains water, and the third alcohol, to prevent the escape of any of the ether.

The theory of the formation of nitric ether remains obscure; the series of changes, however, are obviously different from those which take place in the production of sulphuric ether. The acid is in great part decomposed, there is no precipitation of carbonaceous matter from the alcohol, the liquor remaining transparent, and of a light yellow colour, and the ether contains an acid. Thenard found that the elastic fluid disengaged during the process consists of nitrogen, nitric and nitrous oxide, and carbonic acid gases, holding dissolved ether, and a portion of acid partly nitrous, partly acetic.

The composition of nitric ether, too, is doubtful; Boullay and Dumas, however, have recently inferred, from a careful analysis of it, that it consists of two equivalents of olefiant gas, one of water, and one of hyponitrous acid.

Nitric ether is light and highly volatile; its colour is usually yellow; its odour is strong and penetrating, though not so fragrant as that of sulphuric ether; when pure and concentrated, its volatility is such, that it instantly evaporates when poured from a phial, and boils at 70° under the common atmospheric pressure; it is highly inflammable: with alcohol it combines in every proportion, but in water it is soluble only in limited quantity. This ether has scarcely in its pure form been applied to any medicinal use; though it not improbably is possessed of powers analogous to those of sulphuric ether. There seems to be no utility in retaining the process.

SPIRITUS ÆTHERIS NITROSI. Spirit of Nitrous Ether. Ed.

"Take of Strong Alcohol, three pounds; Nitrous Acid, one pound. Pour the alcohol into a large phial placed in a vessel full of cold water, and add the acid gradually, agitating them frequently. Close the phial lightly, and set it aside for seven days in a cool place; then distil the liquor with the heat of boiling water into a receiver kept cold with water or snow, until about three pounds come over."

SPIRITUS ÆTHERIS NITRICI. Spirit of Nitric Ether. Lond.

"Take of Rectified Spirit, two pints; Nitric Acid, by weight, three ounces. Add the acid gradually to the spirit, and mix them, taking care that the temperature shall not rise higher than 120°; then with a gentle heat distil twenty-four fluid-ounces."

SPIRITUS ÆTHEREUS NITROSUS. Nitrous Ethereal Spirit. Dub.

"Add to what remains after the distillation of Nitrous Ether, the Rectified Spirit which had been employed in the process to condense the elastic vapour, and distil with the highest heat of a water-bath to dryness. Mix this distilled liquid with the alkaline solution remaining after the separation of the nitrous ether, and add also as much very dry carbonate of potash as shall be sufficient to neutralize the free acid, ascertaining this by the test of litmus. Lastly, distil this with the mean heat of a water-bath while any liquid comes over. The specific gravity of the distilled spirit is to that of distilled water as 850 to 1000. Nitrous ethereal spirit may also be prepared by adding gradually two ounces of nitric acid to a pound, by measure, of rectified spirit, and distilling twelve ounces with a proper apparatus, and the application of a gentle heat."

A preparation similar to that of the Edinburgh Pharmacopœia has long been employed in medicine. It consists probably of nitric ether diluted with alcohol, and contains always a portion of free acid. It is not difficult to add the nitric acid to the alcohol in the proportion of one to three parts, at least from this quantity of acid added with precaution no violent action results. If heat were applied to this mixture, however, so as to raise it to 212°, a mutual decomposition, attended with the rapid extrication of elastic products, would take place. The heat must therefore be either applied very slowly, not exceeding 180°, or the method ordered by the Edinburgh Col-

lege must be followed, that of allowing the mixture to stand for some days in a cool place. During this time, a mutual action is exerted between the acid and alcohol; the former is partially decomposed, and the heat required for distillation can be safely applied. That this decomposition takes place, is proved by the cxperiments of Bayen. He digcsted an ounce of nitrous acid with two ounces of alcohol for five weeks; the liquor then required for its saturation only 134 grains of an alkaline base, while an ounce of the same acid required to saturate it 282 grains of the same basc; and when, after digesting the acid and alcohol together, he submitted them to distillation, on mingling the product and the residual liquor, the whole was capable of neutralizing only 32 grains. By this reciprocal action of the acid and alcohol, a portion of nitric ether is formed, which distils over with a portion of unchanged alcohol, and of free acid. The propriety of the change which has been made by the London College, of diminishing so much the proportion of nitric acid, may be questioned, both as less nitric ether must be formed, and as a considerable share of the medicinal efficacy of the preparation depends on the free acid.

The first process of the Dublin College gives a preparation different from the others, in containing no free acid, the nitric acid which exists in thc residual liquor employed being saturated by the alkali. On this account, and as thc preparation of nitric ether is seldom attempted, the second process, which resembles that of the London College, is preferred, but the formula in the Edinburgh Pharmacopœia seems to have advantages above either of the others.

Spirit of nitric ether has an odour extremely fragrant; its tastc is pungent and acidulous; it is volatile and inflammable, soluble readily both in alcohol and water. It is employed principally as a grateful refrigerant in inflammatory affections, as a diuretic in dropsy, or rather as an auxiliary to promote the operation of more powerful diuretics, and as a stimulant relieving nausea and flatulence. Its dose is thirty or forty drops, taken in a cupful of watcr.

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# CHAP. XVII.

## EXTRACTA—EXTRACTS.

Extracts are preparations obtaincd by digesting or boiling vegetable substances in watcr, alcohol, or proof-spirit. The menstruum dissolves the active matter of the vegetable; the tincture or decoction is strained, and is evaporated until a mass of stiff consistence is obtained. This is named an Extract; and is either an aqueous or spiritous extract, as water or alcohol has becn employed as the menstruum. It was formerly supposed that a principle, to which the name of Extractive was given, existed in plants, was the cause of their medicinal powers, and being purified from other vegetable mat-

ter in the extracts, rendered them more active. But for the existence of such a common principle there is no evidence, and the medicinal virtues of plants seem rather to depend on a number of peculiar principles of a resinous, gummy, acid or alkaline nature.

As the active principles of vegetables are not all soluble in one menstruum, in the preparation of extracts several media are used, water, alcohol, and proof-spirit. The last is the most efficient, as it extracts both those substances which are soluble in alcohol, and those that are dissolved by water. The use of these media affords the distinction of *watery* and *alcoholic* extracts.

It might be supposed, that extracts would be advantageous forms of exhibiting vegetable remedies; that much of the inert woody matter would be got rid of; that in watery extracts, the acid, or alkaline, or gummy principles, in which the virtues of certain plants reside, would be procured in a concentrated and purer form; that alcohol would extract active resinous matter, and proof-spirit gum resins. And to a certain extent this is the result, yet there are difficulties involved in the preparation of extracts, which not unfrequently cause the loss of all medicinal power. The essential oil, on which the grateful flavour and aromatic quality depend, is dissipated in the extraction, along with any other volatile principle ; and, in the progress of the boiling and evaporation, the vegetable matter attracts oxygen from the air, by which its chemical nature is changed, and it becomes nearly inert ; lastly, re-action between the elements of the different principles often takes place, by which their medicinal properties are injured or destroyed.

The method of Mr. Barry, of evaporating vegetable fluids *in vacuo* already mentioned, (p. 301,) has been applied by him with much success to the preparation of extracts ; and the experience of many practitioners has decided, that extracts formed in this mode are much superior in activity and uniformity of effect to those procured in the common way. Another method is to place the weak decoction, which is to be evaporated, under the exhausted receiver of an air pump, with a vessel containing concentrated sulphuric acid, as in the ingenious method contrived by Sir John Leslie for freezing water by its own evaporation. In this arrangement the evaporation is rapid even at natural temperatures, and very perfect extracts are produced. Thus prepared, however, they are expensive.

The evaporation of extracts ought to be performed as speedily as possible, that the elements of the plant may not have time to act on each other; but it should not be conducted over an open fire, as the extract is frequently burnt, or otherwise injured. The water-bath scarcely communicates heat with sufficient rapidity, hence the process is frequently conducted in vessels heated by steam.

Extracts are more easily obtained from dried than from fresh vegetables ; the plant should, in general, also be reduced to a coarse powder. When the extracts have been prepared, they should be put, when cold, into well glazed earthen-ware vessels, and carefully excluded from the air. The sprinkling them with spirits is unnecessary, for it soon evaporates ; if they are placed in a dry place they will keep for years.

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The following Table by M. Recluz exhibits the relative quantities of extract afforded by different vegetables, from which extracts are prepared for medical purposes, the solvent and mode of operation employed being such as afford the largest products. The weight of the vegetable matter which was used was 16 ounces.

| Plant. | Part employed. | Solvent used. | Mode of Operation. | Product from 16oz. | | Consistence | |
|---|---|---|---|---|---|---|---|
| | | | | oz. | dr. | At first. | Afterwards. |
| Aloe spicata, . . . . | Concrete juice | Water | Maceration | 8 | 4 | Dry. | Dry. |
| Artemisia absinth. . | Herb, dry | Do. | Decoction | 6 | 6 | Pilular. | Soft. |
| ——— | Do. do. | Al. .915 | Maceration | 8 | 6 | Do. | Do. |
| Anthemis nobilis, . | Flowers, dry | Water | Digest. at 86° | 2 | 5 | Do. | Very hard. |
| ——— | Do. do. | Al. .887 | Maceration | 8 | 6 | Do. | Hard. |
| Cinchona oblongif. | Bark, dry | Water | Decoction | 5 | 4 | Do. | Pilular. |
| ——— | Do. do. | Al. .837 | Maceration | 5 | 4 | Do. | Do. |
| ——— cordifol. . | Do. do. | Water | Decoction | 4 | 6 | Do. | Do. |
| Cucumis colocynth. | Fruit, dry | Do. | Do. | 6 | 0 | Do. | Friable. |
| Convolv. jalapa, . . | Root, dry | Al. .897 | Maceration | 4 | 4 | Do. | Pilular. |
| Conium maculat. . | Herb, fresh | Water | Infusion | 5 | 0½ | Do. | Very soft. |
| Elaterium, . . . . . | Fruit, fresh | Juice | Subsidence | 0 | 5 | Do. | Pilular. |
| Gentiana lutea, . . | Root, dry | Water | Digest. at 86° | 9 | 0 | Do. | Do. |
| Glycyrrhiza glab. . | Root, dry | Do. | Decoction | 8 | 0 | Do. | Do. |
| Hæmatox. camp.. . | Wood, rasped | Do. | Do. | 2 | 6 | Hard. | Hard. |
| Humulus lupulus, . | Strobiles, dry | Do. | Digestion | 1 | 4 | Pilular. | Pilular. |
| Leontodon tarax. . | Leaves, dry | Do. | Decoction | 3 | 4 | Do. | Do. |
| Nux vomica, . . . . | Seeds, scraped | Al. .897 | Maceration | 1 | 2 | Do. | Very soft. |
| Papaver somnif. . . | Capsules | Water | Digest. at 86° | 3 | 4 | Do. | Soft. |
| Rheum palmatum, . | Root, dry | Do. | Digest. at 122° | 10 | 0 | Do. | Dry. |
| ——— | Do. do. | Al. .897 | Maceration | 4 | 2 | Dry. | Dry. |
| Ruta graveolens, . | Leaves, fresh | Water | Decoction | 1 | 3 | Pilular. | Soft. |
| Sambucus nigra, . | Berries, fresh | Juice | Inspissation | 2 | 0 | Do. | Pilular. |
| Smilax sarsapar. . | Root, dry | Water | Decoction | 6 | 0 | Do. | Firmer. |
| ——— | Do. do. | Do. | Infusion | 2 | 7 | Do. | Do. |
| Spartium scopar. . | Leaves, fresh | Do. | Decoction | 1 | 3 | Do. | |
| Stramonium, . . . . | Seeds, dry | Do. | Decoction | 1 | 4 | Do. | Soft. |

The Edinburgh and Dublin Colleges preserve the distinction of Watery and Spiritous Extracts: the London College do not observe it; and they have farther associated with what are more strictly named Extracts, the inspissated juices of vegetables, the consistence of these being similar; and the only circumstance in which they differ, that in the one the matter naturally dissolved in the juice of the plant, in the other the matter extracted by the operation of a solvent is obtained by evaporation, is not, it has been conceived, sufficiently important to constitute a distinction between them. I have adhered, however, to the arrangement of the Edinburgh Pharmacopœia, and, under the Chapter of Inspissated Juices, have already introduced those preparations of this nature which are peculiar to the London Pharmacopœia.

I. Extracta per aquam. Extracts by Water. Ed. Extracta simpliciora. More simple Extracts. Dub.

The directions for preparing these are thus given in the Edinburgh Pharmacopœia:

"Pour on the root from which an Extract is to be obtained, cut and bruised, eight times its weight of Distilled Water. Boil to one-half, and expressing it strongly, strain the liquor. Reduce the boiled

liquor immediately to the consistence of thick honey by evaporation in a bath of boiling water, saturated with muriate of soda."

The Dublin College give the following general directions:

"The Simpler Extracts, unless it be otherwise ordered, are to be prepared according to the following formula:—Boil the vegetable matter in eight times its weight of water to the consumption of half the liquor; then express the liquor, and, after the impurities have subsided, strain it; evaporate with a superior heat (from 200° to 212°,) until it begin to thicken; lastly, inspissate it with a medium heat (of from 100° to 200°), stirring frequently, until it attain a consistence fit for forming pills."

The directions in the London Pharmacopœia are in part given under the individual extracts, and partly under the following general formula:

"In preparing all extracts, evaporate as quickly as possible, in a shallow open vessel, by a water-bath, until the consistence be such as is fit for forming pills, and towards the end stir constantly with a spatula. Sprinkle on all the softer extracts a little spirit of wine."

Extractum anthemidis nobilis ex floribus siccatis. Ed. Extractum anthemidis. Lond. Extractum florum chamæmeli. Dub. Extract of Chamomile.

The bitterness of chamomile is rendered rather ungrateful in its infusion by the flavour of its essential oil. This is entirely dissipated by decoction, and the extract is therefore a pure and grateful bitter. It is scarcely applied, however, to any use; but it may be prescribed with advantage in dyspeptic affections, especially where there is an aversion to bitters, as it can be given in the form of a pill. Its dose is ten or fifteen grains.

The formula for preparing this and the five following extracts, according to the different Colleges, is given above in the general direction of the Pharmacopœias.

Extractum gentianæ luteæ, ex radice concisa et contusa. Extract of Gentian. Ed. Dub.

This extract is intensely bitter, the quality of bitterness appearing in general not to be injured by evaporation; the boiling, however, which the London College direct, weakens the extract. It is sometimes used to form other medicines into pills, especially those with which it coincides in medicinal virtue. It is often given with chalybeates, and with sulphate of quinia.

Extractum hæmatoxyli campechiani, ex ligno raso. Ed. Extractum hæmatoxyli. Lond. Dub. Extract of Logwood.

The astringency of the logwood is obtained with no sensible injury in this extract. It has been proposed to be employed as an astringent, but has never been established in use. Its dose is from ten to twenty grains. It becomes very hard by keeping, so that pills made of it pass through the body unchanged.

Extractum hellebori nigri ex radice contusa. Ed. Extract of the Root of Black Hellebore.

This extract has been employed as a cathartic, principally in mania, and as an emmenagogue in a dose from five to fifteen grains, but it is uncertain in strength. The spiritous extract, which has a place in some of the foreign Pharmacopœias, is a very active preparation. It has been used as a hydragogue cathartic, and is the basis of Baccher's tonic pills, once highly celebrated in the treatment of dropsy.

Extractum papaveris somniferi, ex capsulis contusis, seminibus exemptis. Ed. Extractum papaveris. Lond. Extract of Poppy.

This extract of the capsule of the poppy retains, to a certain extent, its narcotic quality, but usually so far weakened as to leave it uncertain in strength. It is therefore little used. If carefully prepared, however, either in a water-bath, or by heat from steam, its activity is more equable, and it has been recommended as less liable than opium to occasion nausea and headach. Its dose is from five to ten grains.

Extractum rutæ graveolentis, ex herba. Ed. Extractum rutæ. Dub. Extract of Rue.

As any medicinal virtue belonging to rue resides in its essential oil, this extract must be an injudicious preparation. It has been given in amenorrhœa, in a dose of from ten to fifteen grains ; but it has probably no power.

The following watery extracts have a place in the London, or the Dublin Pharmacopœia :—

Extractum aloes purificatum. Purified Extract of Aloes. Lond.

" Take of Extract of Spiked Aloes in powder, a pound ; Boiling Water, a gallon. Macerate for three days with a gentle heat ; then strain, and put aside, that the impurities may subside. Pour off the purified liquor, and evaporate until it attain a proper consistence."

Extractum aloes hepaticæ. Extract of Hepatic Aloes. Dub.

The object of this preparation is principally to obtain an extract with less resin than is usually contained in aloes : this, it has been affirmed, is equally powerful as a purgative, and is less irritating and more grateful.

Extractum cinchonæ. Extract of Cinchona. Lond.

" Take of Lance-leaved Peruvian Bark bruised, a pound ; Water, a gallon. Boil down to six pints, and strain the liquor while warm. In the same manner, boil it four times in a similar quantity of water, and strain. Having mixed the liquors, evaporate until a proper consistence is attained.

This extract ought to be kept *Soft*, so as to be fit for forming pills, and *Hard*, so as to be reduced to powder."

Extractum cinchonæ. Extract of Bark. Dub.

" Take of the Pale Bark coarsely powdered, a pound ; Water,

six pints. Boil for a quarter of an hour in a vessel almost covered; then having filtered the liquor while hot and set it aside, boil the bark again in an equal quantity of water, and filter again in the same manner; proceed in the same way a third time, and then mixing all the liquors, reduce them to a proper consistence by evaporation. This extract is to be kept in two states; soft for the formation of pills, and hard that it may be reducible to powder."

The direction of the Colleges that the bark be only bruised or coarsely powdered, not reduced to fine powder, is judicious, for it is found that the activity of cinchona and many other vegetable medicines is injured by long trituration, which, like decoction, dissipates volatile matter, or favours chemical change by the action of the air. The decoctions are filtered while hot, because, on cooling, they deposite part of the active matter. The preparation contains, besides the extractive and resinous matter of Peruvian Bark, which has some activity, a salt of cinchona, to which its power is chiefly owing. As a great part of the substance of the bark consists of inert ligneous matter, it might be supposed that some advantage is derived from thus separating the more active principles. During the boiling and evaporation, however, they suffer a chemical change, by absorbing oxygen, and their medicinal power is impaired. Hence the extract obtained is not equal in efficacy to the quantity of bark from which it has been prepared, and its strength is uncertain. Its medium dose is ten grains, which is supposed equivalent to half a drachm of cinchona in substance. The sulphate of quinia is commonly preferred to it, and, indeed, to all the preparations of cinchona, as possessing the tonic and febrifuge virtues without intermixture of inert matter. The Dublin College has therefore given a formula for the preparation of sulphate of quinia, which may here be considered.

Quininæ sulphas. Sulphate of Quinine or Quinia. Dub.

"Take of Yellow Bark coarsely powdered, four pounds; Distilled Water, eight pints; Dilute Sulphuric Acid, two ounces. Mix and digest for four hours in a proper vessel, with a heat between 200° and 212°, frequently shaking, then strain. Mix what remains of the bark with an equal quantity of water, and strain, and repeat this a third time: having mixed the solutions, add of recently burnt and slacked lime as much as will be sufficient to neutralize the acid. Separate the precipitate by bibulous paper; to this add three pints of rectified spirit, and digest them together for six hours, frequently shaking, and filter: digest again the residual powder with an equal quantity of rectified spirit, and strain. Repeat this a third time. Having mixed the spiritous liquors, evaporate nearly to dryness in a water-bath. To the residuum add by degrees as much dilute sulphuric acid as will make the acid slightly in excess in the liquor: lastly, crystallize by evaporation and cooling."

The active principle of Yellow-Bark (cinchona cordifolia,) it was before stated, is quinia. This alkali exists in combination with an excess of cinchonic acid, which is not able alone to withdraw it from the vegetable matter into the form of a pure salt; to do this, the agency of a stronger acid is employed. By the digestion of the bark in dilute sulphuric acid, sulphate of quinia is formed, and by

repeated washing with water extracted from the woody matter. Lime is then added to the solution, which combines with the sulphuric acid, and a precipitate falls, composed partly of sulphate of lime, and partly of quinia, removed in this way from the impurities of the solution. The precipitate is digested several times successively in alcohol, which dissolves the quinia but leaves the sulphate of lime ; by evaporation the quinia is obtained nearly in the solid form, is again combined with sulphuric acid, and by evaporation the pure sulphate of quinia is obtained in crystals. The process is complicated, but not more so than is requisite. Experiments have been made to determine whether the alcohol could be dispensed with, but the product was found to be less. However, one improvement suggested by M. Henry may be adopted, that of conducting the evaporation of the spiritous solution in a retort with a receiver adapted, so that the alcohol may be recovered. The papers and filters should be preserved and washed with acidulated water, which will extract a considerable quantity of sulphate of quinia from them. Portions of bark which have been used to afford the infusion or decoction still contain a large proportion of quinia, and they may be made by this process to afford it in the state of sulphate. The addition of some animal charcoal to the solutions in the process renders the sulphate of quinia whiter. The weight of sulphate of quinia procured should be about a 30th of the weight of bark employed.

Quinia can unite with sulphuric acid in two proportions, forming a sulphate and supersulphate ; in the former, 8 parts of quinia by weight are combined with one part of acid and one part of water ; in the latter 8 parts of quinia are combined with $2\frac{1}{2}$ parts of acid and 2 of water. The neutral sulphate is in white silky acicular crystals, soluble in boiling water, but sparingly so in that fluid when cold ; abundantly soluble in alcohol and in water acidulated with sulphuric acid. The supersulphate which is sometimes formed in the above process, when too much acid has been used, crystallizes in larger prisms, and is more soluble in cold water than the other.

Sulphate of quinia being high priced and in general demand, is subjected to various adulterations, such as with sulphate of lime, boracic acid, stearin, sugar and starch. The presence of the first may be discovered by exposing it to a red heat, when the sulphate of quinia will be destroyed and the earthy matter will remain. To detect the second, dissolve a little in alcohol and inflame the spirit, when boracic acid, if present, will give a green colour to the flame. Stearin, the most common addition, is known by dissolving the sulphate in dilute sulphuric acid, when the fatty matter will remain unchanged. To detect sugar, dissolve the sulphate in water, and add carbonate of potash, which will precipitate the quinia ; the residue is to be treated with alcohol, which will dissolve the sugar, and afford it on evaporation. Starch is detected by iodine, which gives a blue colour with it, but with sulphate of quinia, a precipitate of a cinnamon brown colour, (Dr. Barker.)

The medicinal properties of sulphate of quinia have been already considered, (p. 137.)

EXTRACTUM COLOCYNTHIDIS. Extract of Colocynth. Lond. Dub.

"Take of the Pulp of Colocynth, one pound; Water, a gallon. Boil down to four pints, and strain the liquor while warm; then reduce it by evaporation to the proper consistence."

THE active matter of colocynth, or *Colocyntine*, is only partially soluble in water. Hence this extract is less violent in its cathartic action than the pulp. According to Mr. Phillips, it soon becomes either mouldy, or so tough and hard as to resist trituration and formation into pills. Its dose is from six to ten grains, and it is given as a cathartic where the following preparations would be too stimulating.

EXTRACTUM COLOCYNTHIDIS COMPOSITUM. Compound Extract of Colocynth. Lond. Dub.

"Take of the Pulp of Colocynth cut, six ounces; Extract of Spiked (Hepatic, Dub.) Aloes in powder, twelve ounces; Scammony Gum-resin in powder, four ounces; Cardamom Seeds in powder, an ounce; Hard Soap, three ounces; Proof-spirit, one gallon. Macerate the pulp of colocynth in the spirit with a gentle heat for four days. Strain the liquor, and add to it the aloes, scammony, and soap; then evaporate the spirit until the extract attain a proper consistence, and towards the end of the evaporation mix in the cardamom seeds."

THIS is the officinal preparation which has long had a place in the Pharmacopœias under the name of Extractum Catharticum. It is a combination of the more powerful cathartics; and as these operate more effectually, and with less irritation, when combined, than when one only in a large dose is employed, the composition is well adapted for administration in cases where it is difficult to excite purging. It is also useful in stimulating the uterine system. Dr. Montgomery mentions an instance in which it expelled a tape-worm. The addition of soap has been blamed, as it is supposed to render the extract incompatible with calomel. There is no just ground, however, for this apprehension, and it has the advantage of rendering the compound more soluble, so that pills formed of it, even when hardened by age, will still be sufficiently soluble in the secretions of the stomach. The extract is usually given in doses of from five to ten or fifteen grains, repeated at short intervals, until it produce purging. Its power may be promoted by adding a portion of calomel. Dr. Paris states, on the authority of Sir Henry Halford, that the addition of extract of hyoscyamus renders the operation of colocynth much milder, without lessening its power.

EXTRACTUM ELATERII. Extract of Elaterium. Lond.

"Cut the Ripe Fruit of Elaterium, and strain the juice very lightly expressed through a fine hair-sieve into a class vessel; then put it aside for a few hours, until the thicker part subsides. The thinner part, which swims above, being rejected, dry the thicker part with a gentle heat."

EXTRACTUM ELATERII. Extract of Elaterium. Dub.

"Slice Wild Cucumbers over a basin, express the juice very

gently, and strain it through a very fine hair-sieve into a glass vessel. Put it aside for some hours until the thicker part subside; the liquid above being rejected, dry the fecula on a linen cloth, covered by another, with a gentle heat."

From the mode of preparation, it is obvious that this consists of a matter which had been suspended in the juice, so that the term extract is applicable to it only in an extended sense; it consists of starch, extractive, gluten, lignin, and elatin, the last being in the proportion of 10 *per cent.* It has been used as a hydragogue in dropsy, and as a cathartic in obstinate constipation; and, used for this purpose, its action is peculiar, as it produces a great degree of febrile excitement, so that the pulse may be felt to the ends of the fingers. The violence, and, in some measure, the uncertainty of its operation, prevent its frequent use; though in dropsy, where other powerful evacuants have not succeeded, it is sometimes tried in small repeated doses, cautiously administered.

Extractum glycirrhizæ. Extract of Liquorice. Lond.

"Take of Liquorice Root sliced, one pound; Boiling Water, a gallon. Macerate for twenty-four hours, then boil down to four pints, and strain the liquor while warm; lastly, evaporate to a proper consistence."

Extractum glycirrhizæ. Extract of Liquorice. Dub.

This is prepared according to the general formula already inserted.

The soluble matter of this root appears to be chiefly sugar and mucilage, and it suffers, therefore, little or no injury in this extraction of it by water, or in the subsequent evaporation. The extract is usually prepared on a large scale, and much of it is imported into this country. It is often, however, in an impure state. Purified by solution in water, straining and evaporation, or prepared with care from the root itself, and evaporated nearly to dryness, it forms the Refined Liquorice of the shops. Under this form it is in common use as a demulcent in catarrh. Sometimes it is taken to relieve acidity in the stomach.

Extractum humuli. Extract of Hop. Lond.

"Take of Hops, four ounces; Water, a gallon. Boil down to four pints, and strain the liquor while it is hot; then reduce it by evaporation to the proper consistence."

Extractum humuli lupuli. Extract of Hops. Dub.

Hop has been introduced into practice as a narcotic, possessing also from its bitterness a degree of tonic power. The bitterness will be obtained in this extract, but it is probable that the narcotic power is impaired, and that in this property it will not be uniform in strength. Dr. A. T. Thomson recommends it to be given with subnitrate of bismuth, in dyspepsia.

Extractum opii. Extract of Opium. Lond.

"Take of Opium cut into pieces, sixteen ounces; Water, a gallon. Add to the opium a small quantity of the water, and macerate

for twelve hours that it may become soft; then add gradually the remaining water; triturate until they are intimately mixed, and put aside that the impurities may subside; then strain the liquor, and evaporate to the proper consistence."

Extractum opii aquosum. Watery Extract of Opium. Dub.

"Take of Opium, two ounces; Boiling Water, a pint. Rub the opium with the water for ten minutes, and after a little time pour off the liquor; rub the remaining opium with an equal quantity of boiling water for the same time, and in like manner pour off the liquor. Repeat this a third time; then mix the liquors, and expose the mixture to the air in an open vessel for two days. Lastly, strain through linen, and by gentle evaporation form an extract."

Any process of this kind designed to purify opium is altogether superfluous, for the impurities of the opium of commerce are inconsiderable, and neither alter its powers nor add materially to its bulk. And if such processes are designed to correct any of the qualities of the opium, whence the unpleasant symptoms which sometimes follow from its administration are supposed to arise, they probably rest on inaccurate views of its operation. The active matter of opium is by no means entirely extracted by water, for a considerable portion of morphia is found to exist in the residual matter. The product must besides be altered, and rendered uncertain in strength, by the chemical change which it will suffer during the inspissation. Even when the active principles of the opium have been extracted by diluted alcohol, (the method which was formerly followed in the process of the Pharmacopœia,) though the solvent is more powerful, requires less heat for its evaporation, and counteracts to a certain extent the action of the air, the inspissated mass is found to be inferior in strength to opium in its unpurified state, and this must be still more the case in the present process, where water is only employed. It is a process, therefore, the propriety of which is extremely doubtful.

Extractum sarsaparillæ. Extract of Sarsaparilla. Lond. Dub.

"Take of Sarsaparilla Root cut, a pound; Boiling Water, a gallon. Macerate for twenty-four hours, then boil down to four pints, and strain the liquor while warm; lastly, reduce it by evaporation to the proper consistence."

Sarsaparilla being usually given under the form of watery decoction, there appears to be no particular advantage in preparing from this an extract, as the decoction may be brought to any state of concentration, by using an increased proportion of the root, or continuing the boiling for a longer time. And a watery mucilaginous extract as this is, besides the injury it will suffer in its inspissation, will farther be liable to spontaneous decomposition on keeping, and is therefore unfit for an officinal preparation. Even by those who consider sarsaparilla as a valuable remedy, this is regarded as an inactive form of it. When it is given it is in doses of twenty or thirty grains dissolved in the decoction.

Extractum sarsaparillæ fluidum. Fluid Extract of Sarsaparilla. Dub.

"Take of Sarsaparilla Root sliced, a pound; Water, twelve pints. Let them boil together for an hour, and pour off the liquor; then add twelve pints of water, and repeat the boiling and pouring off. Press strongly the liquor from the remaining matter; set aside the mixed liquor until the impurities have subsided; then evaporate the mixture by continual boiling down to thirty ounces, and add two ounces of rectified spirit."

The same remarks apply to this as to the former preparation, but this is rendered still more inert, by the long boiling and exposure to air at a high temperature; it is also liable to spoil. If this extract produces the beneficial effects which are ascribed to sarsaparilla, it will be a sufficient proof that the virtues of the plant are purely negative.

Extractum teraxaci. Extract of Dandelion. Lond. Dub.

"Take of the fresh Root of Dandelion bruised, a pound; Boiling Water, a gallon. Macerate for twenty-four hours, then boil down to four pints, and strain the liquor while hot; lastly, evaporate it to the proper consistence."

The recent root of dandelion (Leontodon Taraxacum) has been ranked as an aperient and diuretic. The expressed juice or decoction of the root has been employed as a remedy in dropsy, biliary obstructions and induration of the liver; and, according to Bergius, and more lately Dr. W. Phillip and Dr. Pemberton, has provéd successful where other remedies had failed. Half a drachm of the extract may be given four or six times a-day, dissolved in cinnamon or mint water.

Extractum stramonii. Extract of Thorn Apple. Lond. Dub.

"Take of Thorn Apple Seeds, a pound; Boiling Water, a gallon. Macerate (digest, Dub.) for four hours in a covered vessel near the fire; then take out the seeds and bruise them in a stone mortar; when bruised return them into the liquor. Boil down to four pints, and strain the liquor while warm. Lastly, evaporate to a proper consistence."

This extract has been found useful in quieting maniacal paroxysms, and for relieving sciatica; but its operation is uncertain, hence it is rather a hazardous remedy. When prepared *in vacuo*, by Mr. Barry's process, it is found more uniform and powerful.

The following Watery Extracts, peculiar to the Dublin Pharmacopœia, are prepared according to the general formula already inserted.

Extractum cacuminum absinthii. Extract of the Tops of Wormwood. Dub.

This extract is intensely bitter, and the unpleasant odour of the plant is dissipated during the evaporation. It may be substituted for extract of gentian. It is sometimes used instead of hops, to give bitterness to fermented liquors.

Extractum spartii scoparii cacuminum. Extract of Broom-tops. Dub.

The infusion of the tops of the broom has a degree of diuretic power, whence it has been employed as a remedy in dropsy. The extract can scarcely be supposed to have much power, and it is now expunged from the Edinburgh Pharmacopœia, where it formerly had a place.

Extractum corticis quercus. Extract of Oak Bark. Dub.

In this extract the astringency of the oak bark will be obtained probably with little injury, and consisting principally of tannin, it will not be very liable to spontaneous decomposition. It can have scarcely any advantage, however, but what may be equally obtained from the decoction.

II. Extracta per aquam et alcohol.—Extracts by water and alcohol. Ed.—Extracta resinosa. Resinous extracts.

The directions for preparing these, in the Edinburgh Pharmacopœia, are as follow:

"Pour upon the substance in powder from which an extract is to be obtained, four times its weight of stronger alcohol. Digest for four days, and pour off the tincture. Boil the residuum in five pounds of distilled water for a quarter of an hour, and strain the decoction while boiling hot through linen. Repeat this boiling and straining with an equal quantity of distilled water, and reduce the liquor by evaporation to the consistence of thin honey. Draw off the alcohol from the tincture by distillation, until it is reduced to a similar consistence. Then mix the liquors thus inspissated, and reduce to a proper consistence by evaporation in a bath of boiling water, saturated with muriate of soda."

The alcohol is employed in this process to dissolve the resinous matter, on which the virtues of the plants in part depend, and which is not soluble in water. Water is added, that it may dissolve other principles which may not be easily soluble in alcohol; and thus, by the joint action of these fluids, almost all the active matter is extracted from the vegetable. These solutions are then inspissated by the application of a gentle heat; the evaporation is not, however, conducted in open vessels, as there would be a considerable loss of alcohol in the process, but in a common distilling apparatus, by which the greater part of the spirit is recovered, and may be again employed for the same purpose: indeed, the alcohol thus procured will be fitter for the process, as it will probably be impregnated, in a certain degree, with the more volatile principles of the plant.

In this manner are prepared,

Extractum cinchonæ lancifoliæ, ex cortice. Extract of Pale Bark.

Extractum convolvuli jalapæ, ex radice. Extract of Jalap.

Extractum cinchonæ resinosum. Resinous Extract of Bark. Lond.

"Take of Lance-leaved Peruvian Bark bruised, two pounds;

Rectified Spirit, a gallon. Macerate for four days, and strain. Let the tincture be distilled from a water-bath until it is of a proper consistence."

This preparation will probably be more active than the watery extract of bark already noticed. By the joint action of the alcohol and water, the principles of the bark are in a great measure extracted, and scarcely any thing remains but the inert ligneous fibre. And in the subsequent evaporation, the dissolved matter suffers less injury, partly from less heat being required to bring it to the due consistence, and partly perhaps from the alcohol resisting the oxygenation or decomposition of the extract. It is, however, much more expensive; and the extract of bark to be found in the shops is almost always that which is prepared by the other formula. The dose of the spiritous extract is ten grains. It affords a convenient vehicle for combining bark with the more active preparations of iron in the form of pills.

Extractum jalapæ. Extract of Jalap. Lond. Dub.

"Take of the Root of Jalap bruised, one pound; Rectified Spirit, four pints; Water, a gallon. Macerate the jalap root in the spirit for four days, and pour off the tincture. Boil down the residuum with the water to two pints. Then strain the tincture and the decoction separately; evaporate the latter, and distil the former until each begin to become thick. Lastly, mix the extract with the resin, and evaporate, (by the heat of boiling water, Dub.) to the proper consistence.

"This extract is to be kept *soft*, so that it may be fit to form pills, and *hard*, that it may be rubbed into powder."

In the preparation of this extract, both the resinous and mucilaginous parts of the jalap root are dissolved. It exerts its cathartic operation fully in a dose of ten or twelve grains. It is often used to form pills, in combination with other purgatives, and is considered less irritating, and less apt to gripe than some of them, as the compound extract of colocynth.

Extractum rhei. Extract of Rhubarb. Lond. Dub.

"Take of the Root of Rhubarb bruised, one pound; Proof-spirit, a pint; Water, seven pints. Macerate for four days with a gentle heat, then strain, and put aside the liquor that the impurities may subside; pour off the clear liquor, and reduce it by evaporation to the proper consistence."

The purgative power of rhubarb is extracted by water, and it may therefore be obtained by this process. It will equally be obtained, however, in the simple infusion, which, as being an extemporaneous preparation, is preferable to this extract, which, besides the change that may be produced during the inspissation, must be farther liable to decomposition when kept in a soft state. This extract is indeed scarcely more powerful than the powdered root, requiring to be given in nearly equal doses. It has the advantage, however, that it may be dissolved in aromatic waters.

Extractum nucis vomicæ. Extract of Nux Vomica. Dub.

"Take of Nux Vomica scraped, eight ounces; Proof-spirit, two pints. Digest in a close vessel for three days, strain the liquor, and express what remains by a press; to this add a pint and a half of Proof-spirit, digest the mixture for three days and express the residuum. Reduce the mixed liquors by distillation to a fourth part, and evaporate to a proper consistence."

STRYCHNIA, it has been stated, (p. 96.) is readily soluble in alcohol, though sparingly so in water, hence the use of spirit is proper in making this extract. Dr. Duncan states, that a mere watery extract he never found to produce any effect; but this alcoholic extract of nux vomica rarely fails to produce the remarkable tetanic state, the inducing of which has been found beneficial in certain forms of paralysis. It would be almost as easy, and scarcely more expensive, to procure from the seeds a pure salt of strychnia, which would be still more efficacious.

GUMMI RESINÆ. Gum-Resins. Lond.

"Separate Opium carefully from extraneous substances, especially on its external surface. Let it be kept in the state of Soft Opium, fit for forming pills; and Hard Opium, rendered so by having been dried in the heat of a water-bath, so that it can be rubbed to powder.

"Those GUM-RESINS are to be accounted of the best quality which can be selected so clean as to require no purification. If they appear to be impure, boil them in water till they become soft, and press them by a press through a hempen bag; then put them aside that the resinous part may subside. The liquor above being poured off, evaporate it by the heat of a water-bath, adding towards the end of the evaporation the resinous part, and mixing it thoroughly with the gummy part into one mass.

"Those GUM-RESINS which melt easily may be purified by being put into an ox bladder, and kept in boiling water until they become soft, so that they may be separated from the impurities by being pressed through an hempen cloth.

"The BALSAM of STORAX is to be dissolved in rectified spirit, and strained; the spirit is then to be distilled with a gentle heat, until the balsam become of the proper consistence."

THESE directions for the purification of GUM-RESINS are the most proper perhaps that can be given; but they are omitted by the Edinburgh College, as it is preferable to use them medicinally, only when in that state in which they do not require purification; for, however cautiously the operation may be performed, they are liable to suffer change from oxidation or the dissipation of volatile principles. The process is admissible, therefore, only with regard to gum-resins which are to be applied externally, as ammoniac or galbanum. STORAX is a substance so rarely employed in medicine, that the ordering it to be purified is superfluous. The directions given by the London College with regard to OPIUM are much to be preferred to any process for purifying it by solution and evaporation, in which operations it always sustains a diminution of power.

# CHAP. XVIII.

## SPIRITUS STILLATITII—DISTILLED SPIRITS.

Alcohol dissolves the essential oils of vegetables in much larger quantity than water does, and it might therefore be supposed that it will be more strongly impregnated with them by distillation, and hence possess in a greater degree the aromatic flavour and pungency of the plant from which it is distilled. It is seldom, however, that this is the case; and from many vegetables alcohol acquires by distillation a weaker impregnation than water. This is owing to its greater volatility. All the essential oils are volatilized at a temperature of 212°, and must therefore rise with water in distillation, and impregnate it to the extent in which it can dissolve them. But there are many of them not volatilized at the temperature at which alcohol boils, and when it is distilled, therefore, from the plants containing such oils, it comes over weakly impregnated with their odour or pungency.

To obviate this, diluted alcohol, or proof-spirit, as it is named, is employed in the distillation. It is macerated on the vegetable substance, and is then distilled; the alcohol rises first nearly pure, but as the distillation proceeds, the liquor requires a higher temperature to cause it to boil; the vapour therefore is more largely impregnated with the essential oil; towards the end of the distillation the whole of it is brought over with the last portion of water; and the spirit, which has previously been distilled, being mingled with this, forms a transparent solution. This forms a distilled spirit; they have frequently a disagreeable flavour, even when carefully prepared, from the proof-spirit being seldom pure. There are only two officinal spirits in which pure alcohol is the solvent,—the spirit of lavender and spirit of rosemary, the essential oils of these plants being sufficiently volatile to be elevated at the temperature at which alcohol distils.

Distilled spirits are preparations of no great importance. Like the distilled waters, they serve as vehicles for the administration of more active medicines, the taste and flavour of which they cover or render more grateful; or they are occasionally employed as grateful stimulants, to relieve nausea or flatulence. The directions for preparing them are given in the Edinburgh Pharmacopœia under a general formula; it is as follows:—

"Pour nine pounds of Diluted Alcohol over the substance to be distilled. Macerate during two days in a close vessel; then add a sufficient quantity of water to prevent empyreuma, and draw off nine pounds by distillation."

The Colleges of London and Dublin use a gallon of proof-spirit, and as much water as may prevent empyreuma, and order a gallon to be distilled over with a slow heat. In this way are prepared the following spirits:

| Spiritus | Spirit of |
|---|---|
| Cari Carui. Ed. | Caraway, from ℔ ſs. of the bruised seeds. |
| — ——— Lond. | ——— ℔ iſs. of the bruised seeds. |
| — ——— Dub. | ——— ℔ i. of the bruised seeds. |
| Lauri Cinn. Ed. Dub. | Cinnamon, from ℔ i. of the bruised bark. |
| Minthæ Piperitæ. Ed. | Peppermint, from ℔ iſs. of the herb. |
| Myristicæ Moschat. Ed. Lond. Dub. | Nutmeg, from ℥ ii. of the bruised kernels. |
| Myrti Pimentæ. Ed. | Pimento, from ℥ vi. of the bruised fruit. |
| ——— ——— Lond. | ——— from ℥ ii. |
| ——— ——— Dub. | ——— from ℥ iii. of the bruised berries. |
| Anisi. Lond. | Aniseed, from ℥ vi. |

The following spirits are directed, in the Pharmacopœias of London and Dublin, to be prepared in a different manner. The essential oil of the plant, according to the directions of the former, is to be mixed with four pints and a half of rectified spirit, and as much water as will prevent risk of empyreuma, and one gallon distilled over. The Dublin College order a gallon of rectified spirit to be used: in other respects the directions are the same. Thus are prepared,

| Spiritus | Spirit of |
|---|---|
| Cinnamomi. Lond. | Cinnamon, from 5 scruples of the oil. |
| ——— Dub. | ——— from 6 scruples of the oil. |
| Menth. Piperit. Lond. | Mint, from 6½ scruples of the oil. |
| ——— Dub. | ——— from 6 scruples of the oil. |
| Pulegii. Lond. | Pennyroyal, from 7 scruples of the oil. |
| ——— Dub. | ——— from 6 scruples of the oil. |
| Rosmarini. Lond. | Rosemary, from an ounce of oil and a gallon of rectified spirit. |
| ——— Dub. | ——— from 6 scruples of the oil. |

This change of method appears to be an improvement; it is more economical, and lessens the risk of empyreuma; the spirits obtained, too, are found to be more equable in strength and flavour than formerly.

All these spirits have the aromatic flavour, and to a certain extent the pungency of the vegetables from which they are prepared, and any medicinal application of them is founded entirely on these qualities. They require, therefore, no particular observations. Their dose is usually from one drachm to three.

Of Compound Spirits, the following have a place in the Pharmacopœias:

Spiritus juniperi compositus. Compound Spirit of Juniper. Ed.

"Take of Juniper Berries bruised, one pound; Sweet Fennel Seeds, Caraway Seeds, of each bruised, one ounce and a half; Diluted Alcohol, nine pounds. Macerate for two days; and, having added as much water as is sufficient to prevent empyreuma, draw off nine pounds by distillation."

Spiritus juniperi compositus. Compound Spirit of Juniper. Dub. Lond.

"Take of Juniper Berries bruised, one pound; Caraway Seeds bruised, Fennel Seeds bruised, of each an ounce and a half; Proof-spirit, a gallon; (Water enough to prevent empyreuma, Lond.). Macerate for twenty-four hours, (then add as much water as will prevent empyreuma, Dub.) and distil one gallon."

This is a cordial spirit, very similar to gin, which has been used as a carminative, and as a stimulant and diuretic in dropsy. It is often exhibited with digitalis. The London College macerate in the spirit and water, the others only in the spirit.

Spiritus anisi compositus. Compound Spirit of Aniseed. Dub.

"Take of Aniseed, Angelica Seeds, of each bruised, half a pound; Proof-spirit, one gallon; Water enough to prevent empyreuma. Macerate for twenty-four hours, and distil one gallon."

This is similar to the preceding spirit, but milder. It has been used as a carminative. Dr. Duncan remarks, that it is merely a simplification of the Irish usquebaugh, and if too often resorted to becomes a mere dram.

Spiritus lavandulæ spicæ. Spirit of Lavender. Ed.

"Take of Fresh Lavender Flowers, two pounds; Strong Alcohol, eight pounds. Draw off seven pounds by distillation with a water-bath."

Spiritus lavandulæ. Spirit of Lavender. Lond.

"Take of Fresh Lavender Flowers, two pounds; Rectified Spirit, a gallon; Water, a sufficient quantity to prevent empyreuma. Macerate for twenty-four hours, then distil off one gallon by a gentle heat."

Spiritus lavandulæ. Spirit of Lavender. Dub.

"Take of the Fresh Flowers of Lavender, two pounds; Proof-spirit, one gallon; Water, as much as will prevent empyreuma. Macerate for twenty-four hours, and distil off, by a moderate heat, five pints."

The Oil of Lavender is sufficiently volatile to be elevated with alcohol in vapour, and is completely dissolved by it. The spirit is used principally as a grateful stimulating perfume, which gives relief in headach, being drawn up the nostrils, or applied to the forehead. What is sold under the name of lavender water is, according to Mr. Brande, a solution of oil of lavender in alcohol, with the addition of small quantities of some other oils. The receipt which he gives for preparing it, directs five gallons of Rectified Spirit of Wine to be mixed with twenty ounces of Essential Oil of Lavender, five ounces of Oil of Bergamote, and half an ounce of Essence of Ambergris, made by digesting one drachm of ambergris and eight grains of musk in half a pint of alcohol.

Spiritus lavandulæ compositus. Compound Spirit of Lavender. Ed.

"Take of Spirit of Lavender, three pounds; Spirit of Rosemary, one pound; Cinnamon Bark bruised, one ounce; Cloves bruised, two drachms; Nutmeg bruised, half an ounce; Red Saunders Wood rasped, three drachms. Macerate seven days, and strain."

Spiritus lavandulæ compositus. Compound Spirit of Lavender. Lond. Dub.

"Take of Spirit of Lavender, three pints; Spirit of Rosemary,

one pint; Cinnamon Bark bruised, Nutmegs bruised, of each half an ounce, (Cloves, two drachms, Dub.); Red Saunders Wood rasped, one ounce. Macerate for fourteen (digest for ten, Dub.) days, and strain."

This tincture is a grateful cordial and stimulant, in common use for relieving languor, and faintness. It is of a fine red colour, and has an agreeable odour, with a warm and aromatic flavour. Its dose is thirty to forty drops, taken on a piece of sugar, or in a cupful of water.

Spiritus rorismarini officinalis. Ed. Spirit of Rosemary.

"Take of Rosemary Tops, two pounds; Strong Alcohol, eight pounds. Draw off seven pounds by distillation by the heat of boiling water."

Spiritus rorismarini. Spirit of Rosemary. Dub.

"Take of Fresh Rosemary Tops, a pound and a half; Proof-spirit a gallon. Distil five pints by a moderate heat."

Spirit of Rosemary is a very fragrant perfume, and is in common use for the same purposes as the simple Spirit of Lavender. Also with a twelfth of its weight of muriate of ammonia, as a lotion in mammary abscesses.

Spiritus armoraciæ compositus. Compound Spirit of Horse-Raddish. Lond. Dub.

"Take of Fresh Horse-raddish root cut, Dried Orange Peel, of each one pound; Nutmegs bruised, half an ounce; Proof-spirit, a gallon; Water, as much as is sufficient to prevent empyreuma. Macerate for twenty-four hours, then distil a gallon with a slow fire."

This compound spirit was supposed to be an antiscorbutic, but seems to have no such power. It is sometimes given with digitalis in dropsy.

Alcohol fortius, Stronger Alcohol. Ed. Spiritus rectificatus, Rectified Spirit. Lond. Dub.

There is no process given in the Edinburgh Pharmacopœia for the preparation of alcohol. It is supposed to be procured from those who prepare it on a large scale, and is inserted in the catalogue of the articles of the Materia Medica, as of the specific gravity .835, this being a strength at which it can be procured without difficulty, and being sufficient for nearly every purpose to which it requires to be applied in Pharmacy. When of this specific gravity it consists, in 100 parts, of 15 of water, and 85 of absolute alcohol.

The London and Dublin Colleges, while they have also inserted alcohol, the former, of the specific gravity also of .835, the latter, of the specific gravity .840, at 60°, under the name of Rectified Spirit, in the catalogue of the articles of the Materia Medica, have given a process to obtain it more concentrated for particular purposes. The following are the directions in the London Pharmacopœia:—

"Take of rectified Spirit, a gallon; Subcarbonate of Potash,

three pounds. To the spirit add a pound of the subcarbonate of potash previously heated to 300°, and macerate for twenty-four hours, shaking frequently; then to the spirit poured off, add the remaining portion of the subcarbonate of potash heated to the same degree; lastly, distil the alcohol from a water-bath, and keep it in a vessel well stopt. The specific gravity of alcohol is to that of distilled water as .815 to 1000."

The process in the Dublin Pharmacopœia is nearly the same:—"Take of Rectified Spirit, a gallon; of Pearl-ashes dried, and still warm, three pounds and a half; Muriate of Lime dried, one pound. Add the pearl-ashes. previously rubbed to powder, to the spirit, and digest the mixture in a close vessel for seven days, agitating frequently. To the spirit poured off, add the muriate of lime; and distil with a gentle heat, until what remains begins to become thick. The specific gravity of the liquor is to that of distilled water as 810 to 1000."

The concentration of the alcohol in these processes is obtained by the action of substances which have a strong affinity to water,—the subcarbonate of potash and the muriate of lime. These attract it from the spirit, and counteract its volatility, so as to prevent it from rising in the distillation.

Alcohol, rectified so highly as is ordered by the London and Dublin Colleges, is required for very few Pharmaceutic processes. Rectified spirit is more commonly used, and still more frequently proof-spirit. The proof-spirit of the Edinburgh College, formed from equal parts of rectified spirit and water, is of the specific gravity of .935. That of the London College is stated at .930, and will be obtained of this strength by mixing four parts by measure of rectified spirit with three parts of distilled water. The proof-spirit of the Dublin College is of the specific gravity .919 at 60°, and may be prepared by mixing $5\frac{1}{4}$ measures of their rectified spirit, (density .840,) with three measures of distilled water at 60°. It is to be wished that the same proof-spirit should be ordered by all the Colleges. That of the Dublin Pharmacopœia has the advantage of being of the same strength with the proof-spirit of the Excise. The properties and medicinal uses of alcohol have been already considered, (p. 65.)

## CHAP. XIX.

### AQUÆ STILLATITIÆ. ED.—AQUÆ DISTILLATÆ. LOND. DUB.—DISTILLED WATERS.

Several of the principles of vegetable matter are so far volatile as to be elevated in vapour at the temperature of 212°; hence, when water is distilled from them, it is frequently impregnated with their taste and odour, and sometimes even with their more active powers. The odour, and frequently the pungency of plants, reside in their

essential oil; and this being always volatile at this temperature, the aromatic plants, in which essential oil is most abundant, communicate these qualities to water distilled from them, a portion of the oil being retained in solution by the water. The acrid principle of some vegetables appears likewise to be so far volatile as to rise in distillation with water; and the Prussic acid, in which the narcotic power of the bitter almond, cherry laurel, and similar plants resides, is also obtained by the same process: But these vegetables are comparatively few, and there are no officinal distilled waters having a place in the Pharmacopœias possessed of any important power; they are designed, from their flavour and agreeable pungency, to serve merely as vehicles for the exhibition of more active remedies, and all of them owe these qualities to the essential oil which they hold dissolved.

Vegetables are in general more proper for distillation in their recent state than after being dried, the waters they afford being more grateful. They are therefore ordered in this state when they can be procured in it by the Edinburgh and Dublin Colleges. The London College, on the contrary, order them to be used dried, as they cannot be procured fresh at all seasons of the year, and as the distilled waters will be less liable to carry over with them mucilaginous or other similar vegetable matter that may cause them to become sour. When fresh, plants in general impregnate sufficiently with their flavour and taste three times their weight of water; when dry, double that quantity. As much must be employed as that a sufficient quantity of water shall remain in the still to prevent any part of the vegetable matter being scorched, and communicating empyreuma to the distilled water, the distillation being continued as long as the liquid that condenses has any taste or smell of the vegetable from which it is distilled. The flavour of the more delicate plants is injured by this operation; and these distilled waters are in general less grateful to the stomach than the infusions of the vegetable matter which yields them. Most distilled waters have, when newly prepared, a peculiar and somewhat unpleasant odour, which they lose by a short exposure to the air, or by keeping them for a few days in vessels slightly covered.

Distilled waters are liable to a peculiar species of decomposition. When long kept, they become mucilaginous, and at length quite viscid, and at the same time somewhat sour. According to Bucholz, this change occurs most readily in those distilled waters which contain little essential oil, and it is not dependent on the air, but takes place even more quickly when the water is kept in a closed than in an open vessel. It seems to be owing to the change in the composition of the oil itself, which may be owing to the chemical action of the oxygen of the water. To counteract this change, and preserve distilled waters more effectually in a proper state, a small quantity of alcohol is ordered to be added to them, which, however, gives them an unpleasant flavour, and it seems preferable, as recommended by M. Chereau, to add the spirit before the distillation. According to Bucholz, they ought also to be kept in vessels imperfectly closed.

It is supposed, that when the waters are distilled from dried plants, they will be less liable to spoil, as there will be less risk of

their carrying over with them mucilaginous or other vegetable matter, which may be acted on by the water and turn sour. Still they alter in time; hence, distilled waters should be prepared frequently, and not in large quantities at once.

The same improvement has been introduced into the last London Pharmacopœia respecting some of the distilled waters, as with regard to several of the "Spirits," that of preparing them, by mixing pure essential oils with water, and distilling these together without using any part of the original plant; in this way no extraneous vegetable matter can pass over with the product. The old process has at the same time been retained; and distilled waters, as procured by it, may first be noticed.

Aqua distillata. Distilled Water. Ed.

"Distil water in clean vessels until about two-thirds have distilled over."

Lond. "Take of Water, ten gallons; distil four pints, which being thrown away, distil over four gallons, which are to be kept in glass bottles."

Dub. "Take of Water, twenty pounds. Put it into a glass retort, and having rejected the first pound which comes over, let one gallon be distilled with a moderate heat."

Water does not occur in nature perfectly pure, but has generally a sensible impregation of saline and earthy matter. Spring water, which is purest, contains a little carbonate of lime, and muriates of lime and soda; river water contains sulphate and carbonate of lime, and muriate of soda: and well water, sulphate and carbonate of lime in larger quantity. For some purposes in Pharmacy, it is necessary to use water free from those substances, particularly in the solution of some earthy and metallic salts, several of which, nitrate of silver for instance, or acetate of lead, are decomposed by them, and, if they are given in small doses, may, by such decompositions, be rendered nearly inert; external application also, as collyria, may be thus rendered almost useless. In preparations, too, where much water is evaporated, as in the formation of extracts, it has been judged preferable to employ distilled water, as the residual matter of common water will remain mixed with the product of the process, and uselessly add to its bulk, or even in some cases produce in it some chemical change. It is for these purposes that distilled water is ordered in the Pharmacopœias; but except where the use of it is rendered necessary from these circumstances, it ought not to be employed, as, from losing in the distillation much of the air that it holds loosely dissolved, it is always vapid and unpleasant; and when directed in Pharmaceutical processes without discrimination, the direction is liable to be altogether neglected by the apothecary.

The process should be conducted with rather a gentle heat, and ought not to be continued longer than until two-thirds of the water have distilled, as otherwise a minute portion of the saline matter might be brought over in the distillation. The first portion, too, that comes over, is directed by the London and Dublin Colleges to be rejected.

The directions for the preparation of the Distilled Water of Plants are given in the Edinburgh Pharmacopœia under a general formula: "Add as much water to the substance that is to be distilled, that when ten pounds have been drawn off by distillation, a sufficient quantity shall remain to prevent empyreuma. After due maceration, distil ten pounds; to which are to be added five ounces of weak spirit."

In the London and Dublin Pharmacopœias, the water, after maceration on the vegetable matter, is directed to be distilled, allowing so much to remain in the still as will prevent empyreuma. And in all the Pharmacopœias, half an ounce of rectified spirit is ordered to be added to each pound of water after distillation. With these directions are prepared

| Aqua | Water of |
|---|---|
| Citri Aurantii. Ed. | Orange-peel, *from two pounds of fresh orange-peel.* |
| Citri Medicæ. Ed. | Lemon-peel, *from two pounds of fresh lemon-peel.* |
| Lauri Cassiæ. Ed. | Cassia Bark, *from one pound of the bruised bark.* |
| Lauri Cinnamomi. Ed. Dub. | Cinnamon, *from one pound of the bruised bark.* |
| Menthæ Piperitæ. Ed. Lond. Dub. | Peppermint, *from three pounds of the green herb, or a pound and a half of the dried herb.* |
| Menthæ Pulegii. Ed. Lond. Dub. | Pennyroyal, *the same.* |
| Myrti Pimentæ. Ed. Lond. Dub. | Pimento, *from half a pound of pimento bruised, (and macerated for 24 hours in a pint of water. Lond.)* |
| Rosæ Centifoliæ. Ed. Lond. Dub. | Rose, *from six (eight, Lond. Dub.) pounds of the fresh pale rose flowers.* |
| Anethi. Lond. | Dill, *from a pound of the bruised seeds.* |
| Carui. Lond. | Caraway, *from a pound of the bruised seeds.* |
| Fœniculi. Lond. Dub. | Fennel, *from a pound of the bruised seeds.* |
| Menthæ Viridis. Lond. Dub. | Spearmint, *from a pound and a half of the dried herb.* |

Orange-peel Water has none of the bitterness of the orange-peel, but merely its flavour, and is so little used, that it is not kept in the shops.

Lemon-peel Water has merely a slightly agreeable flavour, and is scarcely ever used.

Cassia Water, when not prepared too pungent, can scarcely be distinguished from that of the cinnamon, the essential oil of both these barks having a flavour nearly the same. The cassia water, therefore, being less expensive than the cinnamon, is substituted for it in the shops. It has the pungency and aromatic flavour of the cassia, and is hence in common use to cover the ungrateful taste and flavour of other medicines, and not unfrequently is used in large quantities. It is sometimes given alone as an aromatic and stimulant.

Peppermint Water is strongly impregnated with the flavour of the herb, and is very frequently used in mixtures to cover the flavour of other medicines. It is also often taken alone as a carminative.

Pennyroyal Water has a flavour and taste similar to that of peppermint, and is used for the same purposes, but it is rather less grateful.

Pimento Water has the flavour of the Jamaica pepper, and its aromatic quality, but as this is not very grateful, it is not often used.

Rose Water has all the flavour of the rose, and as it has no pungency or acrimony, it is often used for external applications, as in

solutions of acetate of lead, or sulphate of zinc, for collyria. Spirit of wine ought not to be added to it, as this will communicate a stimulating power, which would render it unfit for these applications. Rose water is liable to decomposition, and soon becomes sour; hence it has been recommended to preserve rose leaves, by packing them with salt in close vessels, and to distil the water from them in small quantities at a time. Otto or Attar of roses, which is the essential oil of the flowers, remarkable for its powerful odour, is prepared, according to some, by distillation from large quantities of the petals, but according to others, it is obtained by immersing rose leaves in water, and allowing the vessel to remain a few days exposed to the sun, when the otto will collect as a scum on the surface, and is removed by cotton.

Dill Water. Its flavour is rather unpleasant, and it has little pungency.

Caraway Water has a considerable share of aromatic flavour and pungency, and may be employed as a carminative.

Fennel Water has merely the weak flavour of the seeds, with little warmth.

Spearmint Water. Its flavour and taste are similar to those of peppermint or pennyroyal, but less grateful; it has however some efficacy in allaying irritability of the stomach, and is used to put a stop to vomiting; the infusion of mint is preferable.

Four of the distilled waters which have been mentioned are directed by the London and Dublin Colleges to be prepared, either from the plant as just described, or from the essential oil. These are, Aqua cinnamomi. Cinnamon Water. "Take of Oil of Cinnamon, by weight, five scruples. Pour so much water upon the oil, that after the distillation a sufficient quantity may remain to prevent empyreuma. Distil one gallon." In the same way are prepared the others, using three drachms of Oil of Peppermint, Oil of Spearmint, and Oil of Pennyroyal."

Aqua lauro-cerasi. Laurel Water. Dub. "Take of the fresh Leaves of the Cherry Laurel, a pound; Water, three pints. Distil a pint, and add, instead of rectified spirit, an ounce of compound spirit of lavender."

Laurel Water is a powerful narcotic, and in the quantity of an ounce or two may occasion death. It is useful as a sedative, and has the advantage over pure prussic acid of not being so liable to decomposition, (p. 97.) In the present preparation the compound spirit of lavender is added, that it may not be mistaken for common water, as has in some instances happened.

# CHAP. XX.

## OLEA VOLATILIA—VOLATILE OILS.

Essential oils differ little in their chemical characters, but the sensible qualities of odour and taste vary as they are procured from different plants. Their odour is that of the plant from which they are procured; their taste also is frequently the same, particularly in those plants named aromatic, and it is always pungent and acrid; their colours are shades of yellow, green and brown; they are usually liquid, but sometimes of a thick consistence. They are highly inflammable, and burn with much flame and smoke. They are all soluble in alcohol and ether; they also combine with the expressed oils. They have been called volatile, from the readiness with which they rise with the vapour of water in distillation; but this depends more upon their chemical attraction to aqueous vapour than upon their volatility, for, when heated alone, they require to be raised to a temperature considerably higher than 212° before they will pass rapidly into vapour. In general they are lighter than water, but some are heavier, as the oils of cassia, cinnamon, cloves and pimento. The pungency of essential oils varies greatly, and is not proportional to that of the plant which yields them: thus oil of cinnamon is acrid and almost caustic, while the oil of black pepper is comparatively mild and bland.

In a few cases these oils, existing in distinct vesicles, can be obtained by expression, as those of lemon, orange and bergamotte. Usually they are diffused through the vegetable matter, so as to render this impracticable; they are then obtained by distillation: the heat could not be applied, however, with sufficient uniformity, and within the due degree, to the vegetable matter alone: it is therefore distilled with a portion of water, not larger than what is necessary to avoid empyreuma at the end of the distillation. The oil is volatilized with the watery vapour; and though a portion remains dissolved, yet from the sparing quantity of water employed, the greater part is collected apart, either according to its specific gravity, floating on the surface, or having subsided to the bottom. In performing the operation in the large way, the same water is repeatedly put into the still, by which the loss from the oil being dissolved is in a great measure avoided. The product of oil is very different from different plants; and the most odorous and pungent plants do not always afford the largest quantity, even where the oil is the principle in which the odour or pungency resides;—the petals of the rose, for example, or the bark of the cinnamon, affording a quantity extremely small, though in the one of these the oil has the entire flavour of the flower, and the other the aromatic warmth of the bark. The quantity and quality of the oil are also influenced by the circumstances of climate, soil and season; the rich aromatic oils being generally more fragrant from the plant when growing in a warm climate and dry soil,

than under the reverse of these; and the oil afforded by the aromatic vegetables of this climate is in general stronger, and in larger quantity, in a dry than in a wet season. The herbs are sometimes used fresh, sometimes dry; it is said that more oil is obtained from the latter. In this country, the essential oils distilled are chiefly those from lavender, peppermint, spearmint, pennyroyal; the oils of caraway, chamomile, juniper, aniseed, marjoram, pimento, and rosemary, are usually imported. An essential oil, at its first distillation, has frequently an odour less grateful than after it has been kept for some time; by age, however, its flavour is impaired. If the air be not carefully excluded it becomes thick; some oils, alongst with this change, deposite a little camphor, some a portion of benzoic acid, and others, when distilled anew, yield an oil similar to the original oil, a resinous substance being left.

The essential oils of commerce are sometimes adulterated, either by the addition of a cheaper oil, as that of turpentine, of an expressed oil, or of alcohol. These frauds are easily detected,—the first, by the smell, which is perceptible when the adulterated oil is dropt on paper, and heated so far as to be volatilized; the second, by the impure oil forming a greasy spot when it is dropped on paper, which remains so after heat has been applied; the third, by the impure oil, when dropt on water, forming a milky, instead of a transparent film on the surface of the water. Mr. Barry's process of distilling *in vacuo* has been applied to the preparing of essential oils with great advantage; the products are extremely pure, and free from all empyreuma and foreign flavour. A cheaper and easier method, and which has been found to afford nearly as pure oils, is to place the flowers in a basket within the still, and raised above the water, so that only the steam reaches them; by its heat and chemical attraction the steam extracts the oil, and carries it over into the receiver.

Essential oils are seldom employed to answer any important indication in medicine, having scarcely any other powers than those of aromatic warmth and pungency. If used alone to relieve flatulence or nausea they may be diffused in water by the medium of mucilage and sugar, or they may be dissolved in alcohol, and the solution diluted with water; or they are sometimes given dropt on a piece of dry sugar. More generally they are employed as corrigents, to improve the taste and flavour of ungrateful medicines, to cause these to sit easier on the stomach, or to obviate nausea, or any unpleasant symptom they may be liable to produce.

The following general rules with regard to the preparation of these oils are given in the Pharmacopœia.

Olea volatilia. Ed. "A sufficient quantity of water is to be poured on the substance to be acted on, as to prevent empyreuma during the distillation. After a proper maceration let the distillation be made, and then separate the oil from the water.

"It is also to be observed with regard to the preparation of distilled waters and oils, that according to the quality of the substances, their texture, the season of the year, and similar circumstances, so many differences must arise, that it is scarcely possible to give any

certain and general rules which shall apply strictly to every example. Many things therefore are omitted, to be regulated according to the judgment of the operator, the most general directions only being delivered."

Olea distillata. Distilled Oils. Lond.

"The Seeds of Anise and Caraway, the Flowers of Chamomile and Lavender, the Berries of Juniper and All-spice, the Tops of Rosemary, and the fresh herbs of the other articles, are to be employed. Put the substance from which the oil is to be distilled into an alembic, adding as much water as will cover it, and distil the oil into a large refrigeratory."

Olea essentialia. Essential Oils. Dub.

"Let the substance be previously macerated in water, then put into an alembic, and heat applied by means of the vapour of boiling water, and let the liquor distil over into a receiver; separate the oil by a proper apparatus from the surface or bottom of the fluid, as it may happen to float or sink."

In the two latter Pharmacopœias, it is added, that the water which is produced in the distillation of the oils of caraway, peppermint, spearmint, pennyroyal, pimento, and fennel, may be preserved for use. It is always the practice in the shops to preserve the water distilled from the plant, as it is sufficiently impregnated with the flavour and taste. It is liable, however, when it has been repeatedly distilled, which is the common practice, to avoid the waste of oil, to be rendered less grateful than when only once distilled.

According to these directions are prepared the following oils:

| Oleum Volatile | Volatile Oil |
|---|---|
| Anthemidis. E. L. | Of Chamomile, *from the flowers.* |
| Juniperi. E. L. D. | — Juniper, *from the berries.* |
| Juniperi Sabinæ. E. D. | — Savine, *from the leaves.* |
| Lavandulæ Spicæ. E. L. D. | — Lavender, *from the flowers.* |
| Lauri Sassafras. E. D. | — Sassafras, *from the root, bark and wood.* |
| Menthæ Piperitæ. E. L. D. | — Peppermint, *from the recent herb in flower.* |
| Myrti Pimentæ. E. L. D. | — Pimento, *from the berry bruised.* |
| Origani Majoranæ. E. L. D. | — Marjoram, *from the herb in flower.* |
| Pimpinellæ Anisi. E. L. D | — Aniseed, *from the seed.* |
| Rorismarini. E. L. D. | — Rosemary, *from the flowering tops.* |
| Carui. L. D. | — Caraway, *from the seeds.* |
| Menthæ Viridis. L. D. | — Spearmint, *from the leaves and flowers.* |
| Pulegii. L. D. | — Pennyroyal, *from the leaves and flowers.* |
| Fœniculi Dulcis. D. | — Fennel, *from the seeds.* |
| Rutæ. D. | — Rue, *from the leaves and flowers.* |

Oil of Chamomile has an unpleasant flavour, and is scarcely ever used, although it has been said to be sometimes beneficial in cramp of the stomach. Dose five to ten minims.

Oil of Juniper, when genuine, has the flavour of the juniper berries, and is soluble in alcohol. There is generally substituted for it in the shops an oil distilled from some species of turpentine, much less grateful, which alcohol does not dissolve. The genuine oil is powerfully diuretic, and it communicates this property in some degree to ardent spirit, as in Hollands, which are flavoured by juniper berries. Dose three to ten minims, diffused in water by means of mucilage.

Oil of Savine.—This plant yields more essential oil than any

other does, two pounds affording not less than five ounces. The virtues of the savine seem also to depend on it, as the essential oil is said to be a powerful emmenagogue in a dose from three to ten drops. It is, however, very little used.

Oil of Lavender is used principally on account of its flavour as a perfume, sometimes also as a stimulant. Dose two to six minims. It is sometimes added to ointments containing sulphur, to disguise that substance.

Oil of Sassafras is the heaviest of the essential oils, its specific gravity being 1.094; its odour is somewhat fragrant, and its taste warm, but it has no quality that renders it of much value.

Oil of Peppermint.—This is one of the most pungent of the essential oils, and at the same time it excites a peculiar sensation of coolness in the mouth. It is a common and convenient remedy to relieve flatulence and anorexia, under the form of the Peppermint Lozenge, and also of what is named Essence of Peppermint,—a solution of one part of the oil in seven parts of alcohol; the dose of this being fifteen or twenty drops in a cupful of water. Peppermint drops, Mr. Brande informs us, are made by heating four ounces of white sugar in powder, in a bright copper ladle, and, when warm, adding to them twenty-four minims of oil of peppermint, and half an ounce of peppermint water. The whole being stirred together, is poured in single drops on a polished piece of marble, where the drops soon harden, and are then to be dried by a gentle heat. Peppermint lozenges are a mixture of starch, sugar, and mucilage of tragacanth, flavoured with oil of peppermint.

Oil of Pimento has the flavour of Jamaica pepper; it is sometimes used in colic and dyspepsia.

The pungent and almost caustic Oil of Marjoram is sometimes used as a perfume, though less grateful than the oil of lavender. It is sometimes given to allay the pain of toothach, which is done by putting three or four drops, on a piece of cotton, in the tooth that is affected. It is used, in some cases, as a stimulating or heating external application to cold tumours, and to relieve numbness.

Oil of Aniseed is chiefly imported from Spain, of a light colour, and has rather an unpleasant smell. It congeals even at a very moderately cold temperature. It has less pungency than any other of the essential oils, and is therefore well adapted to the purpose to which it is usually applied, that of relieving flatulence and the symptoms arising from it in children, a little of it being rubbed with sugar and mixed with the child's food. The common proportion is ten or fifteen drops of the oil to two ounces of sugar.

Oil of Rosemary.—The odour of this oil is less grateful than when it is diluted with alcohol in the form of spirit of rosemary. It is sometimes used in ointments as a perfume, and it enters, as a stimulant, into the composition of the soap liniment.

Oil of Caraway is one of the most grateful of the essential oils, and is well adapted to act as a carminative, or to communicate an agreeable pungency, and cover the flavour of unpleasant remedies.

Oil of Spearmint.—The flavour of this oil is similar to that of peppermint, rather less grateful, and its taste is less pungent.

Oil of Pennyroyal resembles the oil of peppermint and spearmint, and may be regarded as superfluous. It was once regarded as an emmenagogue, but is now scarcely ever used.

Oil of Fennel.—The flavour of this oil is similar to that of anise, and its qualities are so unimportant that it is never used.

Oil of Rue.—The flavour of oil of rue is ungrateful, and though it has been regarded as an emmenagogue, it is altogether discarded from use.

Along with the Volatile Oils are inserted some analogous preparations in the Pharmacopœias.

Oleum succini et acidum succinicum. Oil of Amber, and Succinic Acid. Ed.

"Take of Amber in powder, Pure Sand, equal parts. Put them mixed together into a glass retort, of which they shall fill one half. Having adapted a large receiver, distil from a sand-bath, with a fire gradually raised. First, a watery liquor with a little yellow oil will distil over; then a yellow oil with an acid salt; afterwards, a reddish and black oil. Pour the liquor out of the receiver, and let the oil be separated from the water. Let the Succinic acid, collected from the neck of the retort and the sides of the receiver, be pressed between folds of bibulous paper, to free it from the adhering oil. Then purify it by solution in hot water and crystallization."

Oleum succini purissimum. Purified Oil of Amber.

"Distil Oil of Amber mixed with six times its weight of water, from a glass retort, until two-thirds of the water have passed into the receiver. Then separate this purified volatile oil from the water, and keep it in vessels well stopt."

Acidum succinicum et oleum succini. Dub.

"Take of Amber, in coarse powder, Pure Sand, of each one part. Distil with a heat gradually raised, an acid liquor, oil, and salt contaminated with oil. Having removed the salt into bibulous paper, submit it to pressure to force out the oil; then sublime it. The oil may be obtained separate from the acid liquor by straining through bibulous paper."

Oleum succini rectificatum. Rectified Oil of Amber. Dub.

"Take of the Oil which rises in the preparation of Succinic Acid, one pound; Water, six pints. Distil until two-thirds of the water pass into the receiver, then separate the oil."

Oleum succini. Oil of Amber. Lond.

"Put Amber into an alembic, and distil from a sand-bath with a heat gradually raised, an acid liquor, oil, and salt contaminated with oil. Then distil again, and also for a third time, the oil."

Amber is a bituminous substance, found in layers of bituminated wood, or in fragments or masses on the sea-shore in different countries, derived from beds of brown coal. It differs from vegetable resins in the products it affords when decomposed by heat. These products are an acid, which exists in it, named Succinic Acid; and a peculiar empyreumatic oil. The process is conducted according to the directions given in the Pharmacopœias. The heat requires to

be raised gradually, and the interposition of the sand is useful by dividing the particles of amber, and preventing it, when it melts, from swelling up, and passing over into the receiver. Dr. Duncan remarks, however, that the use of sand renders the residuum unfit for the purposes of the varnish maker.

The succinic acid is in part dissolved by the water which condenses in the receiver, but the greater part is condensed in the form of a crust. When purified from the adhering oil, it is obtained in minute white crystals. In medicine it has been regarded as an antispasmodic and diuretic; but it appears to be wholly inactive, and is altogether discarded from practice.

The oil of amber procured by the first distillation is thick, of a dark-brown colour, and a very fetid smell; by successive distillations it can be rendered nearly limpid. It is sometimes applied by friction as a stimulant in paralysis, and to relieve the pain of cramp and rheumatism: but its strong unpleasant smell renders the application disagreeable. It is said to be useful in hooping cough, rubbed on the chest; and Mr. Brande informs us that a remedy of this kind, of some celebrity, known by the name of Roche's Embrocation, consists of half an ounce of Oil of Amber, mixed with half an ounce of Oil of Cloves, and an ounce of Olive Oil. Dr. Duncan is of opinion that the tar oil prepared in the manufacture of coal gas might be substituted for oil of amber, and it has the advantage of being much cheaper.

Oleum volatile pini purissimum. Rectified Oil of Turpentine. Ed.

"Take of Oil of Turpentine, one part; Water, four parts. Distil as long as any oil passes over."

Oleum terebinthinæ. Oil of Turpentine. Dub.

"Take of Common Turpentine by weight, five pounds; Water, four pints. Distil the oil from a copper alembic. Yellow resin will remain after the distillation."

Oleum terebinthinæ rectificatum. Rectified Oil of Turpentine. Dub. Lond.

"Take of Oil of Turpentine, two pints, (one pint, Lond.); Water, four pints. Distil a pint and a half of the oil, (distil the oil, Lond.)."

The oil of turpentine of commerce is obtained by distillation from what is named Common Turpentine, the juice of the *Pinus sylvestris*, (Scotch Fir.) It appears to hold dissolved a small portion of resinous matter, as when again distilled it leaves a little of a thick residuum, and the rectified oil has been said to be more volatile than previous to this distillation. The process, however, is difficult to perform, from the great volatility of the oil, and the diffusibility and inflammability of its vapour: it is one, too, which is nearly superfluous, the common oil being sufficiently pure for any purpose to which it requires to be applied in medicine or pharmacy, and it is accordingly never attended to in the shops. The nauseous flavour of the oil is said to be removed by agitating it with an eighth part of the strongest alcohol; on this being done several times, the alcohol being each time poured off, the oil seems to be freed from resin, and is almost devoid of taste or smell; it however soon recovers both.

The internal medicinal use of this oil has been already considered. Externally, it is an excellent application in rheumatism, a slip of flannel moistened with it being bound on the part. Whitehead's Essence of Mustard, which is said to be useful in rheumatism, consists of oil of turpentine, camphor, and spirit of rosemary, with a small quantity of flour of mustard. The oil is also applied by friction to parts affected with cramp, and as a styptic to bleeding wounds. It is an excellent application to scalds and burns, in the manner proposed by Mr. Kentish. As soon after the accident as possible, heated oil of turpentine is applied to the part, by which the pain is in a short time allayed, and the extent of vesication diminished. The part is then covered with pieces of cloth dipped in a liniment of oil of turpentine, in which a quantity of yellow resin has been melted, or a liniment still better is one composed of equal parts of oil of turpentine and lintseed oil. This is renewed once a-day till the inflammation subsides, when less stimulating applications are employed; and when suppuration begins, the parts are to be covered with powdered chalk slightly warmed. This mode of treatment has been found successful in very severe cases.

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## CHAP. XXI.

### SALINA—SALINE SUBSTANCES.

By the term "Saline Substances," or Salts, are commonly understood all compounds of acids with alkalis, earths and metallic oxides. They can scarcely be said to possess such an assemblage of properties as to distinguish them with precision from other classes of bodies; but, in general, they exhibit the following characters. They can be obtained in the solid form, and most of them have a disposition to crystallization; they are fusible, uninflammable, have a sapid taste, and are soluble in water. These properties, however, do not belong to every salt, and there are other bodies which exhibit them, yet are not considered as saline; hence, the only definition of a salt not liable to exception, is drawn from its chemical nature, that it is a compound of an acid, with an alkaline, earthy or metallic base.

In the Pharmacopœias the term is intended to include the acids and alkalis which are used in medicine, while the earthy salts are reserved for a separate division, and the metallic salts are placed in connection with the metals. The acids and alkalis were formerly termed Simple, or Primary Salts; the others Secondary, or Neutral Salts, the properties of the acid, and of the alkali of which they are formed, being usually neutralized. These are the substances comprised under the present chapter, with a few associated with them for convenience, though not strictly connected with them. They are most of them important preparations; but differing widely in chemical constitution and medicinal powers, they admit of no general observation.

Acidum aceticum tenue. Weak Acetic Acid. Ed.

"Distil eight pounds of Vinegar with a gentle heat in glass vessels. The pound that comes over first is to be set aside as too watery, the five pounds that follow will be the Weak Acetic Acid. The distillation is to be continued as long as a colourless acid comes over; but as it is too much burnt, and not suited for internal use, it is to be mixed with the first pound, and may be employed for various chemical purposes."

Acidum aceticum dilutum. Diluted Acetic Acid. Lond.

"Take of Vinegar, a gallon. Distil the acetic acid in a sand-bath, from a glass retort into a glass receiver kept cold; the first pint being rejected, keep the six pints that are next distilled."

Acetum distillatum. Distilled Vinegar. Dub.

"Take of Wine Vinegar, ten parts by measure. Distil eight parts with a gentle heat, employing glass vessels in the distillation, and rejecting the first portion which comes over, amounting to one part.

"The specific gravity of this acid is to that of distilled water as 1005 to 1000."

Vinegar consists of acetic acid, largely diluted with water, and mixed with a little alcohol, tartaric acid, extractive, glutinous, and saccharine matter, and a very small portion of sulphuric acid, which the manufacturer is allowed to mix with it. From these it is purified by distillation; at least it retains in combination only a very small portion of extractive matter. The distilled liquor is however weaker than the vinegar itself, as the acid is less volatile than the water, whence a large portion of it remains in the residual liquor; in general, it receives from the distillation somewhat of an empyreumatic odour. It is usual, on the large scale, to perform the distillation in a tin still, connected with a tin spiral tube in a refrigeratory, and to add portions of boiling water during the distillation, so as to dilute the residual liquor, and bring over the whole of the acid. The process, however, ought to be conducted in glass vessels, as directed in the Pharmacopœias; as, from metallic ones, (tin, which has been employed, being often alloyed with lead, and even copper vessels being sometimes used,) the acid may receive an impregnation that might prove noxious. The distillation of vinegar, for the purposes of chemistry and medicine, is now rendered in a great measure unnecessary, as pyroligneous acid is manufactured in large quantities of considerable strength and purity. One part of this acid, of the sp. gr. 1.046, diluted with six parts of water, will give a weak acetic acid, preferable to any distilled vinegar.

Distilled vinegar is colourless; it is not very sour to the taste; its odour is usually slightly empyreumatic. The specific gravity has been taken by the Dublin College as an index of the strength of the acid, but it is not a certain one, as there is often an intermixture of the peculiar light fluid termed Pyro-acetic spirit, which lessens the density. The proper test of the strength of distilled vinegar is the quantity of an alkaline carbonate required to saturate it. According to Mr. Phillips, 100 grains of distilled vinegar, of the specific gravity 1.009, require for saturation 14.5 grains of crystallized subcarbonate

of soda. It is chiefly employed as a solvent of some vegetable substances, and in making some of the salts. It has the advantage, as a pharmaceutic agent, not only of greater purity, but of not being liable, like undistilled vinegar, to spontaneous decomposition.

Acidum aceticum forte. Strong Acetic Acid. Ed.

"Take of Dried Sulphate of Iron, one pound; Acetate of Lead, ten ounces. Rub them together. Put them into a retort, and distil from sand with a moderate fire, as long as any acid comes over."

Acidum aceticum. Acetic Acid. Dub.

"Take of Acetate of Potash, one hundred parts; Sulphuric Acid, fifty-two parts. Put the acid into a tubulated retort, and add to it gradually, and at different intervals of time, the acetate of potash, allowing the mixture to cool after every addition; then distil the acid with a moderate heat, until the residuum is dry. The specific gravity of this acid is to that of distilled water as 1074 to 1000."

In the first of the above processes, the expulsion of the acetic acid from the acetate of lead is favoured by the affinity exerted to the oxide of lead by the sulphuric acid of the sulphate of iron; and as these salts are dried, or contain little water of crystallization, the acid is supposed to be obtained in a concentrated state. In the process given by the Dublin College, the sulphuric acid combines with the potash of the acetate of potash, and disengages the acetic acid. This distils over; and as the acetate of potash contains little water, and the water of the sulphuric acid must be in part retained by the affinity exerted to it by the sulphate of potash, the acetic acid is obtained in a concentrated form. The following diagram exhibits the kind of re-action that takes place:

| | | | |
|---|---|---|---|
| 49 Liquid Sulphuric Acid | Sulphuric Acid | 40 | 88 Sulphate of Potash. |
| | Water . . . | 9 | |
| 117 Acetate of Potash | Water . . . | 18 | |
| | Potash . . . | 48 | |
| | Acetic Acid . . | 51 | 78 Liquid Acetic Acid. |

There is thus obtained an equivalent of acetic acid combined with three equivalents of water. The proportion of sulphuric acid ordered by the College is larger than its exact equivalent, partly to effect the complete decomposition of the acetate, and partly because the sulphate of potash, with an excess of acid, is more soluble and more easily extracted from the retort.

In the Parisian Pharmacopœia, acetic acid is procured from acetate of copper, (verdigris,) exposed to heat in an earthen retort; and this was the process formerly given in the London Pharmacopœia.

Of these processes, that given by the Dublin College seems to be the best, but none of them is now requisite, a pure and stronger acid being procured by distillation from wood, as was already stated, (p. 256.) The London College, accordingly, insert this "Stronger Acetic Acid" among the articles of the Materia Medica, and give no process for its preparation.

Acetic acid, in its concentrated state, has a fragrant, and, at the

same time, very sharp penetrating odour; its taste is extremely sour and pungent, and it is so acrid as to inflame the skin. It is highly volatile, evaporating at the common temperature of the atmosphere; it is also inflammable, and kindles when a burning body is approached to its vapour. It exerts the agencies of a powerful acid, and it has a peculiar action on several of the proximate principles of vegetables, whence it can be applied to pharmaceutical purposes,—dissolving them without decomposing them, or materially altering their properties. It thus dissolves resins, gum-resins, camphor and essential oils. It is employed medicinally, principally as a stimulating perfume in languor or faintness, or to obviate the unpleasant smell of confined or corrupted air. The combination of it with camphor is used for this purpose, as has been noticed under the chapter of medicated vinegars; the camphor being dissolved in the strong acid.

Acidum benzoicum. Benzoic Acid. Ed.

"Take of Benzoin, twenty-four ounces; of Subcarbonate of Soda, eight ounces; Water, sixteen pounds. Boil the benzoin, rubbed with the subcarbonate, in the water for half an hour, stirring them constantly, and strain. Boil what remains of the balsam in other six pounds of water, and strain. Mix these decoctions, and evaporate until two pounds remain. Strain again, and drop into the liquor, as long as there is any precipitation, diluted sulphuric acid. Dissolve the precipitated benzoic acid in boiling water. Strain the liquor while hot, through linen, and put it aside that crystals may form. Dry and preserve these crystals, having previously washed them with cold water."

Acidum benzoicum. Benzoic Acid. Lond.

"Take of Benzoin, a pound; put it into a glass vessel placed in sand, and by applying a heat of 300° gradually increased, sublime till no more rises; press what is sublimed, wrapped in bibulous paper, to separate it from the oil; then again sublime with a heat not increased above the 400th degree."

Acidum benzoicum. Benzoic Acid. Dub.

"Take of Benzoin, five parts; Lime fresh burnt, Muriatic Acid, of each one part; Water, two hundred parts. Triturate the benzoin with the lime, then boil the mixture in 130 parts of water; allow the vessel to stand, and pour off the liquor when cold. Boil the remainder in seventy parts of water, and again pour off the liquor. Mix the liquors, and evaporate to one-half, filter through paper, and to the liquors, when cold, add gradually the muriatic acid. Lastly, having poured off the liquors, wash the precipitate with a small quantity of cold water, dry it with a gentle heat, put it into a proper vessel, and with a slow fire sublime the benzoic acid."

Benzoic acid seems to exist, fully formed, in benzoin, and hence, being volatile, is easily expelled by heat. This method, adopted by the London College, is the one by which it is usually obtained. Scheele proposed, as more economical, the process, of which those of the other Colleges are modifications. In that given by the Edinburgh College, the acid of the benzoin combines with the soda of the carbonate of soda, forming a soluble salt; the sulphuric acid, when

added, combines with the soda, and the benzoic acid, being sparingly soluble in cold water, is precipitated. In the Dublin process, lime is used instead of soda, and muriatic instead of sulphuric acid.

The quantity of benzoic acid obtained by sublimation in the process of the London Pharmacopœia is greater than can be obtained by the other methods, the product, according to Mr. Brande's experiments, amounting to two ounces from a pound of benzoin, while, by the others, it is equal only to about one ounce and six drachms. But there is a difficulty in conducting the process by sublimation, from a portion of the oily matter of the benzoin being liable to rise with the acid in vapour, and communicating to it a brown tinge. By managing the heat with due precaution, and changing the receiver towards the end of the sublimation, this may be avoided, at least so far as to obtain a pure product, nearly equal in quantity to that from the other methods; and as the sublimed acid is more white and brilliant than the precipitated acid, even when the latter is dissolved and crystallized, this method is generally followed by the practical chemist, as besides it is less troublesome, and upon the whole more economical than the others.

Benzoic acid is in slender needle-like crystals, or in soft flakes of a white colour and silky lustre; its taste is pungent and acidulous, its odour aromatic; this odour, however, appears to arise from a minute portion of oily matter adhering to it, as, by dissolving the acid in alcohol, and precipitating it by water, it is obtained nearly inodorous. It is volatile and inflammable, is scarcely soluble in cold water, but is dissolved by hot water, and is also soluble in alcohol. It has been regarded as a stimulating expectorant, but is totally destitute of medicinal efficacy, and the sole consumption of it is in the composition of the paregoric elixirs of the Pharmacopœias, in which it has long been an ingredient, and from custom is still retained.

Acidum citricum. Citric Acid. Lond. Dub.

"Take of Lemon Juice, a pint; Prepared Chalk, an ounce, or as much as may be sufficient to saturate the juice; Diluted Sulphuric Acid, nine fluid-ounces. Add the chalk gradually to the lemon juice heated, and mix them; then pour off the liquor. Wash the citrate of lime which remains with warm water, frequently added; then dry it. To the dried powder add the diluted sulphuric acid; boil for ten minutes; express the liquor strongly through linen, and strain through paper. Evaporate the strained liquor so far, that, on cooling, crystals shall form. To obtain these crystals pure, dissolve them in water a second and third time; strain the solution each time; evaporate, and put it aside to crystallize."

The process of the Dublin Pharmacopœia is similar, only employing any quantities of lemon-juice and chalk, and of sulphuric acid eight times the weight of the chalk.

The juice of the lemon consists principally of citric acid, (p. 274,) water, gum and extractive matter. When the chalk is added to it, the lime in this substance combines with the citric acid and forms citrate of lime, which being insoluble, is precipitated: the precipitate is washed to carry off the adhering vegetable matter, and is

submitted to the action of diluted sulphuric acid ; the sulphuric acid combines with the lime and disengages the citric acid ; this, dissolved by the water, is pressed out from the sulphate of lime, and by the evaporation of the solution is brought to crystallize. The crystals are at first of a brownish tinge, from the reaction, it has been supposed, of the sulphuric on the citric acid. By a second or third solution and crystallization they are obtained colourless. The following diagram shews the nature of this decomposition :

| | | |
|---|---|---|
| 86 Citrate of lime | Citric Acid 58<br>Lime 28 | 76 Cryst. Citric Acid. |
| 53 Liquid Sulph. Acid | Water (2 at.) 18<br>Sulph. Acid 40 | 68 Sulphate of Lime. |

Mr. Phillips found, that 100 grains of the fresh juice of sp. gr. 1.044, decompose 14.8 grains of crystallized sub-carbonate of soda, whence it follows, that one pint of the juice will decompose rather more than six drachms of chalk ; the citrate of lime formed required, he found, four ounces and a half of sulphuric diluted acid, or, for every drachm of chalk used, six drachms of diluted acid should be employed. It thus appears that the quantity of acid ordered in the Pharmacopœia is too large, although, as Dizé remarked, a slight excess of sulphuric acid is useful to decompose a small portion of mucilage or extractive matter, which adheres to the citric acid, and opposes its crystallization. The drying the citrate of lime in the middle of the process is unnecessary ; indeed, it will be decomposed more readily when moist.

Citric acid may be procured from many other fruits. As there is much loss in the successive crystallizations, the acid can be manufactured economically only on the large scale.

Citric acid crystallizes in rhomboidal prisms ; it is easily soluble in water, has a taste extremely sour, and reddens deeply the vegetable colours. In its solid state it remains unchanged, and even in solution is not very liable to spontaneous decomposition. It is used, as has already been remarked, as a refrigerant, and in forming the common effervescing draught, being mixed with carbonate of soda, and water added.

Acidum muriaticum. Muriatic Acid. Ed.

" Take of Muriate of Soda, previously heated to redness, Sulphuric Acid, Water, of each two pounds. Mix the acid with eight ounces of water, and when the mixture has cooled, pour it upon the muriate of soda in a glass retort ; then adapt a receiver containing the rest of the water, and distil from a sand-bath with a moderate fire. In a short time the vessels may be luted together, and the distillation continued to dryness.

" The specific gravity of the acid is to that of distilled water as 1170 to 1000."

Acidum muriaticum. Muriatic acid. Lond.

" Take of Dried Muriate of Soda, two pounds : of Sulphuric Acid, twenty ounces by weight ; of Distilled Water, a pint and a half. Mix the acid with half a pint of the water in a glass retort, and add

to these when cold the muriate of soda. Pour what remains of the water into a receiver; then a retort being adapted to it, transmit into this water the muriatic acid distilled from a sand-bath, with a heat gradually increased, until the retort become red.

"The specific gravity of muriatic acid is to the specific gravity of distilled water as 1160 to 1000. 100 grains of this acid saturate 124 grains of crystallized subcarbonate of soda."

Acidum muriaticum. Muriatic Acid. Dub.

"Take of Dried Muriate of Soda, one hundred parts; Sulphuric Acid of commerce, eighty-seven parts; Water, one hundred and twenty-four parts. Mix the acid with one-half of the water, and after it has cooled, pour it on the muriate of soda previously introduced into a glass retort. Pour what remains of the water into a receiver so connected with the retort as to absorb the gas, then distil to dryness."

In these processes, the sulphuric acid, according to the old theory, combines with the soda of the muriate of soda, and with the assistance of the heat applied, disengages the muriatic acid gas, which is condensed partly by the water volatilized with it, and partly by the water in the receiver. According to the views of Gay-Lussac and Davy, now generally received*, dried muriate of soda is not a salt, but a compound of chlorine with metallic sodium, or a *chloride of sodium.* When this is dissolved in water, the chlorine attracts hydrogen from the water present, the sodium attracts oxygen, and muriate of soda is reproduced, which is then decomposed by the sulphuric acid; that acid combines with the soda, and the muriatic acid rises with a portion of watery vapour, and passes over into the receiver. The following diagram represents the action that takes place in the Dublin form of the process, supposing with Dr. Barker that eight equivalents of water pass over with the muriatic acid:

| | | | |
|---|---|---|---|
| 69 Muriate of Soda | Muriatic Acid | 37 | 109 Liquid Muriatic Acid. |
| | Soda . . . . . | 32 | |
| 112 Dilute Sulph. Acid | Water 8 (atoms) | 72 | |
| | Sulphuric Acid | 40 | 72 Sulphate of Soda. |

The liquid muriatic acid thus formed should have a density of 1160.

The principal difference in the process in the different Pharmacopœias is with regard to the proportions of the ingredients. In the formula of a former edition of the Edinburgh Pharmacopœia, the

* Throughout this work I have fully adopted the more modern views respecting the nature of chlorine and muriatic acid, namely, that the former is a simple body, and the latter a compound of it with hydrogen. I have done so in deference to the present authorities in chemistry, by whom, with perhaps scarcely an exception, those views are received. I hope it will not be regarded as presumption, notwithstanding, to avow an opinion, that the older doctrine appears to me the more probable, and that I consider the experiments and reasoning of my Father as nearly decisive in its favour. The composition of muriatic acid still remains a problem in science, many and strong analogies leading to the belief that it is an oxygenated body, to which there can only be objected the want of conclusive evidence in its not having as yet been decomposed. In the Appendix to the last edition which I published of my father's Elements of Chemistry, I have given a full statement of the question, and of the reasons on which my own conviction of the truth of the older doctrine is founded.—*Ed.*

proportion of acid was too small, being scarcely so much as on theory should suffice for the decomposition of the muriate of soda; and in performing the process, I observed that a considerable portion of the salt remained undecomposed. The error arose from an opinion that prevailed among chemists, of supposing that it is not requisite in decomposing a salt by an acid, to use more of the acid than its exact equivalent. If such were the case, 100 parts of muriate of soda would be entirely decomposed by 81.6 of sulphuric acid, which is not the fact. It requires an excess of sulphuric acid to expel the whole of the muriatic acid; the reason probably being, as assigned by Berthollet, that quantity of matter has an influence on chemical affinity, and that using more of a body assists its attraction. Experiments have since been made by Mr. Phillips, Dr. Hope, and Dr. Barker, to determine the proportion of acid which it is most advantageous to employ. Mr. Phillips objected to the proportions ordered by the Edinburgh College, which are 100 parts of chloride of sodium and 100 of liquid sulphuric acid, and endeavoured to shew that the London College was more correct in ordering the exact equivalents. Dr. Hope, however, proved distinctly that there is an advantage in using an excess of sulphuric acid, the product of muriatic acid being larger and of greater strength than can be procured by the London formula. Dr. Barker, from a number of experiments, assigned the proportion of 87 of acid to 100 of chloride of sodium, as the smallest proportion of sulphuric acid which can decompose the whole of the salt, and the Dublin College have adopted these quantities. Upon the whole, however, the Edinburgh process will probably turn out in practice to be the most economical.

With regard to the other parts of the process, the direction, that the sulphuric acid be diluted only with a portion of the water, and that the remaining water be put into the receiver, is proper, both as abridging the distillation, and assisting the condensation of the acid gas. An apparatus, on the construction of Woolfe's, is sometimes employed, but is unnecessary, as a range of two or three receivers, without tubes, immersed in the liquid in each, is sufficient. The advantage of diluting the acid with a portion of the water, is, that the rapid effervescence and disengagement of gas produced by the action of the concentrated acid on the muriate of soda is prevented, and the process is rendered more manageable. It is more convenient, however, to pour the acid on the salt in the retort, than to follow the reverse mode directed by the London College. The salt which remains in the retort, which is a mixture of sulphate and bisulphate of soda, is extracted by water when cold, its solution being favoured by the excess of acid; or it may be more quickly removed by pouring boiling water into the retort, when it has cooled down to 212°. In the large way the distillation is sometimes performed from an iron-pot, connected by an earthen head and the tube with a range of receivers, the fire being directly applied, and then the concentrated sulphuric acid is poured directly on the muriate of soda, undiluted, to lessen the action on the iron. But the acid prepared in this way, even when the precaution is followed of coating the inner surface of the pot, is always contaminated with this metal. The

yellow colour which it usually has is not always, however, owing to the presence of iron, but is derived sometimes from a little extractive matter adhering to the sea-salt, and it is to consume this that the salt is ordered, in the Edinburgh Pharmacopœia, to be exposed to a red heat,—an operation which would otherwise be superfluous. The yellow colour may be removed by distilling the acid a second time from a little muriate of soda. Mr. Phillips states, that the specific gravity of the acid obtained by the London formula, instead of being 1.160, is only 1.142.

Muriatic acid exists when uncombined in the elastic form, and is incapable of condensation by any cold or pressure hitherto applied to it. But it is rapidly and largely absorbed by water; the water, at a common temperature, and under a mean pressure, condensing 360 times its volume. When of the specific gravity of 1.70, it contains about 34 of the acid gas and 66 of water; it emits pungent vapours of muriatic acid gas on exposure to the air, reddens deeply the vegetable colours, tastes extremely sour, erodes immediately vegetable and animal substances, and exerts considerable chemical agencies. The acid oxidates inflammable and metallic substances, by enabling them, by a resulting affinity, to attract oxygen from water.

Muriatic acid is applied to few medicinal purposes. It has been given as a refrigerant and antiseptic in scarlatina, and fevers of the typhoid type, in a dose of 10 or 15 drops occasionally: in the same disease it is used largely diluted as a gargle. As a refrigerant, it is sometimes prescribed to relieve ardor urinæ in gonorrhœa. It has also been employed, as has been already stated, as a lithontriptic; and in some cases of calculus, considerable advantage has been derived from it, both in relieving the pain and diminishing the sediment deposited from the urine, probably in consequence of its solvent power being exerted on the phosphate of ammonia and magnesia, or the phosphate of lime, which are frequently ingredients of urinary calculi. By some also it has been recommended as an antidote in general syphilitic affections; the remarks of Mr. Pearson, however, subvert this opinion, still allowing that it exerts, in many cases, a very beneficial and salutary action on the stomach and general health. According to Dr. Paris, if given mixed with a strong infusion of quassia, it is a most effectual remedy in preventing the generation of worms. From its chemical agency it is employed in various pharmaceutic processes. In the state of gas, it has been used to neutralize contagious effluvia, but it is inferior in efficacy to nitrous acid vapour, or chlorine gas.

Acidum muriaticum dilutum. Diluted Muriatic Acid. Dub.

"Take of Muriatic Acid by measure, ten parts; Distilled Water, eleven parts. Mix them.

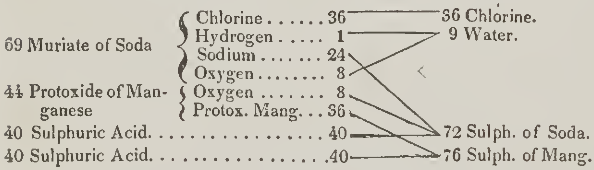
"The specific gravity of this acid is to that of distilled water as 1080 to 1000."

A convenient form of muriatic acid for medical use; its dose is easily apportioned, (30 to 60 drops,) and it does not emit offensive fumes.

Aqua chlorinii. Solution of Chlorine. Dub.

"Take of Muriate of Soda dried, one hundred parts; Oxide of Manganese, thirty parts; Sulphuric Acid, eighty-seven parts; Water, one hundred and twenty-four parts. Add the acid gradually to the water, and when the mixture has cooled, pour it on the muriate of soda and oxide of manganese previously reduced to fine powder, well mixed and put into a retort; then with a proper apparatus, and moderate heat, gradually increased, transmit the gas arising from the mixture through two hundred parts of distilled water, the process being concluded when the effervescence ceases in the retort, Let the chlorine water be kept in well-stopped vessels in a dark place."

When muriate of soda, black oxide (peroxide) of manganese, and sulphuric acid are heated together, the sulphuric acid combining with the soda disengages the muriatic acid; this being presented in its nascent state to the peroxide of manganese is decomposed, its hydrogen uniting with one atom of the oxygen of the latter to form water, while the chlorine escapes; the protoxide of manganese combines with part of the sulphuric acid, and there remain in solution, at the end of the process, sulphate of soda, and proto-sulphate of manganese. Supposing that two equivalents of sulphuric acid are present, the decompositions and new combinations will be represented by the following diagram:




It is not, however, requisite to use two equivalents of sulphuric acid, as part of the peroxide of manganese seems to yield oxygen, although there be not acid to combine with it. In the formula, accordingly, the proportion of sulphuric acid is small compared to the quantity of muriate of soda. It is, indeed, a good general rule to use an excess of the cheapest ingredients, as it renders it more certain that the whole of the expensive ingredient shall be called into action. The dilution of the acid is proper, as the action might be too rapid; and if any part of the elastic product is forced from the apparatus, it is injurious to the operator, from its highly suffocating odour. To effect the combination with water, it is best to use the bottles of Woolfe, so as to transmit the gas through the liquid, the first bottle being left empty to collect a little common muriatic acid that distils over, holding oxide of manganese dissolved.

Chlorine exists in the gaseous form, and is distinguished from other elastic fluids by its colour, which is yellowish-green. It has an intolerable suffocating odour. Water, at a moderate temperature, absorbs twice its volume of it, forming a liquid of a yellowish colour, having the same odour, and a harsh styptic taste. This substance, both in its gaseous and liquid form, is distinguished by its power of destroying the vegetable colours.

Chlorine gas has been employed to neutralize the agency of contagion, and change the noxious constitution of foul or corrupted air. Dr. Willan has employed it in cynanche maligna with some success, and Mr. Braithwaite recommends it strongly in scarlatina. Half a drachm to two drachms, diluted in eight ounces of water, are given in the course of twenty-four hours. Professor Brugnatelli affirms that it is a remedy for hydrophobia. The application of it for neutralizing contagion will be noticed under its history, along with the other gases, in the Appendix.

Acidum nitrosum. Nitrous Acid. Ed.

"Take of Nitrate of Potash bruised, two pounds; Sulphuric Acid, sixteen ounces. The nitrate of potash being put into a glass retort, pour upon it the sulphuric acid, and distil from a sand-bath with a fire gradually raised, until the iron pot is at an obscure red heat.

"The specific gravity of this acid is to that of distilled water as 1520 to 1000."

In this process the sulphuric acid combines with the potash, and disengages the nitric acid. The latter acid, however, suffers a partial decomposition during the distillation, principally from the effect of the heat, and partly from the relation of the acid to water. Nitric acid cannot exist in an insulated state, without being combined with water in the proportion of two equivalents of water, (18,) to one equivalent of acid, (54). If a quantity of sulphuric acid be used, equal to the weight of nitre, as in the London formula, to be immediately considered, this will afford two equivalents of water, and nitric acid only will be formed; but when the smaller proportion of acid in the present formula is employed, a part of the nitric acid suffers decomposition, being resolved into oxygen and nitrous acid, which forms orange vapours. These are condensed by the nitric acid in the receiver, and a dense fuming red liquid is produced, which is a mixture of nitric and nitrous acids; the salt that remains in the retort is a mixture of sulphate and bi-sulphate of potash. It is chiefly towards the end of the process that the decomposition of the nitric acid takes place, the water of the materials having then in a great measure passed over into the receiver, and the heat being higher, the acid is accordingly of a deeper colour, and more fuming as the distillation is continued longer. The small proportion of sulphuric acid ordered in this process by the Edinburgh College is objected to by Mr. Phillips, (see Nitric acid,) as not affording the water which nitric acid requires; and this is undoubtedly true; but there is as little doubt that the product is of greater strength than when more sulphuric acid is employed; the nitrous acid which is formed being condensed in the nitric acid, and producing a mixed acid of greater power than pure nitric acid can ever be obtained of. Accordingly, manufacturers, whose object it is to use the most economical methods, employ even less sulphuric acid than is ordered in the above formula. Nitrous acid thus prepared sometimes contains minute quantities of sulphuric acid and muriatic acid; the first is detected by adding muriate of barytes to the acid diluted with five parts of distilled water, when, if sulphuric acid be present, insoluble sulphate of barytes will

be formed; the other, if present, is detected by nitrate of silver, muriate of silver being precipitated. When not intentionally added, however, these acids are never present in sufficient quantity to render it unfit for medicinal or pharmaceutical use.

Nitrous acid is extensively employed as a pharmaceutic agent; from the facility with which it parts with oxygen, it is one of the most important, particularly in oxidating and dissolving the metals. Its powers as a tonic and antisyphilitic remedy have been already considered; though, when it is internally administered, it is necessarily given in a state of nitric acid, being brought to this state by dilution with water. When sufficiently diluted, it forms an excellent lotion for indolent ulcers; two or three drachms of the diluted acid may be used in a pint of water. It is sometimes, in a state of vapour, employed under the form of fumigation to destroy contagion. (See Appendix.)

Acidum nitricum. Nitric Acid. Ed.

"Take of Nitrous Acid, any quantity. Put it into a glass retort, and a cold receiver being adapted, apply a very gentle heat until the reddest part shall have passed over, and the acid which remains in the retort almost colourless shall have become nitric acid."

Acidum nitricum. Nitric Acid. Lond.

"Take of Nitrate of Potash dried, Sulphuric Acid, each by weight two pounds. Mix them in a glass retort; then distil the nitric acid with the heat of a sand-bath, until red vapours are produced. Lastly, having poured the distilled acid on an ounce of dried nitrate of potash, distil it again in a similar manner.

"The specific gravity of nitric acid is to that of distilled water as 1500 to 1000; 100 grains of this acid saturate 212 grains of crystallized subcarbonate of soda."

Acidum nitricum. Nitric Acid. Dub.

"Take of Nitrate of Potash, one hundred parts; Commercial Sulphuric Acid, ninety-seven parts. Mix in a glass retort, and distil into a receiver connected with a pneumatic apparatus until the residuum shall concrete and be again liquefied. The sp. gr. is 1490."

The process given in the Edinburgh Pharmacopœia is that which has been usually followed by chemists to convert nitrous into nitric acid. Liquid nitrous acid is nitric acid holding dissolved nitrous acid vapour: when heat is applied, this vapour being more disposed than the acid to assume the elastic form, the affinity by which it is retained in combination with it is weakened, and it is disengaged in the state of very deep-coloured nitrous acid fumes. The nitric acid is in this way, however, rendered weaker, and the process is thus so far attended with loss; but this may be obviated by condensing the nitrous acid vapour, by a portion of water put in the receiver, by which a diluted acid will be obtained. The heat ought to be applied by a water-bath, this being sufficiently high to expel the nitrous acid vapour, and being not so high as to produce farther decomposition of the acid.

It is difficult, however, by this method to obtain perfect nitric acid;

that is, the acid altogether colourless; the last portion of nitrous acid vapour, communicating a pale straw colour, is retained by such an affinity, and the volatility of the acid in this state approaches so nearly to that of nitric acid, that the whole distils over. A more perfect process to obtain colourless nitric acid, is to distil the nitrous acid from a little black oxide of manganese, which yields oxygen to it, and converts it into nitric acid.

The process of the London Pharmacopœia is of a different kind. Equal parts of nitre and sulphuric acid are employed, and the equivalent of the former being 102, and of the latter 49, the quantities ordered afford two full equivalents of sulphuric acid to one of nitric; hence, in the decomposition that happens, two equivalents of water (derived from the sulphuric acid) are provided for the nitric acid, in consequence of which none of it is decomposed; the residual salt in the retort is the bisulphate of potash. These results are represented in the following diagram:

| | | |
|---|---|---|
| 98 Liquid Sulphuric Acid, (2. equiv.) | Water . . . 9<br>Water . . . 9<br>Dry acid . 40<br>Dry acid . 40 | 72 Liquid Nitric acid. |
| 102 Nitrate of Potash. | Nitric acid 54<br>Potash . . . 48 | 128 Bisulph of Potash. |

The operation of the excess of sulphuric acid in preventing the partial decomposition which would form nitrous acid, depends on two circumstances: one, that from the quantity adding to the force of the affinity it exerts to the potash of the nitre, less heat is required to effect the decomposition, and the greater part of the nitric acid is brought over before it is necessary, in continuing the distillation, to raise the temperature so high as to evolve nitrous acid vapour; the other, that the water of this excess of acid is volatilized in the progress of the distillation, and preserves the constitution of the nitric acid in the manner which has been explained under the preceding process. The influence of the latter circumstance is very well shewn by the fact, that the product, instead of being superior in specific gravity to nitrous acid, as concentrated nitric acid might be expected to be, is inferior, being, as stated in a report made to the College on the products of this process from different proportions of the materials, 1.50, while the nitrous acid, obtained from 6 of nitre and 3 of sulphuric acid, is stated as having been obtained at 1.53. Indeed, pure nitric acid in its most concentrated state has never, according to Mr. Phillips, a specific gravity greater than 1.5, while the red fuming compound acid may easily be obtained of sp. gr. 1.53 or 1.54, and it is said has even been procured of sp. gr. 1.62. It hence appears, that nitric acid cannot exist in a state of high concentration without a portion of it being partially decomposed.

There has been much dispute respecting the comparative merits of this process of the London College for preparing nitric acid, and that given by the Edinburgh College for procuring nitrous acid. Mr. Phillips objected to the latter, that the quantity of sulphuric acid ordered is insufficient to yield the water necessary to the existence

of nitric acid in an insulated form; that fully two proportions of sulphuric acid are requisite for every proportion of nitric acid that is obtained, and that, therefore, the directions of the London College are preferable, as avoiding the loss by decomposition of the nitric acid from want of water. He adds, that by following the Edinburgh process, he obtained only 13.4 parts of nitrous acid, of the specific gravity 1.534. Dr. Hope, however, has stated, that he always obtains 15 parts of nitrous acid, of a rich orange red colour, and of a specific gravity equal to 1.54. The experiments of Dr. Barker, establish the same result, and there seems little reason for doubt, that to obtain from nitre the largest quantity of acid of the greatest strength, the Edinburgh formula is the best; and if it is wished to get rid of the nitrous acid, simple dilution with water converts it into nitric. The proportions in the Dublin formula, which are those exactly of two equivalents of sulphuric acid and one of nitre, are preferred by Dr. Barker, on the ground chiefly that the residual salt in the retort is bisulphate of potash, which being much more soluble than the sulphate, can be easily extracted, while, in the Edinburgh process, there is often the cost of a retort to be added to the expense of the materials. By pouring boiling water into the retort, when it has cooled to 212°, the salt may be extracted with little difficulty. The drying of the nitre, as ordered by the London College, is altogether superfluous, and, so far as it has any effect, counteracts the object of the process, by favouring the decomposition of the nitric acid: the second distillation is likewise unnecessary.

Nitric acid is applied to the same purposes as nitrous acid. Medicinally they must be the same, as the nitrous, by the dilution necessary for its administration, is converted into the nitric; and in their chemical agencies, and therefore in their pharmaceutic applications, they are precisely alike.

Acidum nitrosum dilutum. Diluted Nitrous Acid. Ed.

"Take of Nitrous Acid, Water, equal weights. Mix them, avoiding the noxious vapours."

Acidum nitricum dilutum. Diluted Nitric Acid. Lond.

"Take of Nitric Acid, a fluid-ounce; of Distilled Water, nine fluid-ounces. Mix them."

Acidum nitricum dilutum. Diluted Nitric Acid. Dub.

"Take of Nitric Acid by measure, three parts; Distilled Water, four parts.

"The specific gravity of this mixture is 1280."

In combining nitrous acid with water, the free oxygen loosely dissolved in the water unites with the nitrous acid and converts it into nitric acid. This, therefore, is diluted nitric acid. It is employed in a number of the chemical processes of the Pharmacopœia, and is convenient, in particular, for the solution of metals, being of that strength at which its action upon them is not too rapid. The diluted nitric acid of the London Pharmacopœia is too weak for this, being not more than one-third of the strength of the analogous preparation in the other Pharmacopœias; it can only be intended for internal administration; and as for this purpose it will require still farther dilu-

tion, the proportion might be left to be regulated by extemporaneous prescription. The deviation from the proportions of the other Pharmacopœias is therefore without any adequate advantage, and may sometimes lead to dangerous consequences in medicinal prescriptions. The diluted acid of the London Pharmacopœia may be given in doses of from ten to forty minims in an ounce or two of water, or any bitter or aromatic infusion.

ACIDUM NITRO-MURIATICUM. Nitro-Muriatic Acid. Dub.

"Take of Nitric Acid by measure, one part; Muriatic Acid by measure, two parts. Mix the acids in a refrigerated bottle, and keep the mixture in a cold and dark place."

WHEN muriatic acid is mixed with nitric acid, the hydrogen of the former unites with one of the proportions of oxygen in the latter, forming water; chlorine and nitrous acid are thus produced, which remain dissolved in the water present. The action of light converts the chlorine again into muriatic acid, hence the direction to keep the mixture in a dark and cold place. This fluid was formerly termed Aqua Regia, from its having the power of dissolving gold. It was introduced into medicine by Dr. Scott of Bombay, and as an application in a dilute state to the skin, in the form of a bath or by sponging, is serviceable in diseases of the liver, (p. 129).

ACIDUM PRUSSICUM. Prussic Acid, or Hydrocyanic Acid. Dub.

"Take of Cyanuret of Mercury, an ounce; Muriatic Acid by measure, seven drachms; Water, by measure, eight ounces. Distil into a cooled receiver eight ounces by measure, to be kept in a well-corked bottle in a cold and dark place. The specific gravity of this acid is to that of distilled water as 998 to 1000."

THE Cyanuret of Mercury employed in this process is prepared according to a formula of the Dublin College, to be considered afterwards. It is, strictly speaking, a bicyanide of mercury, consisting of one atom of mercury, (200,) and two equivalents of cyanogen, (52). When it is heated with muriatic acid mutual decomposition happens, the two equivalents of cyanogen take the hydrogen from two equivalents of the acid, and become prussic acid, while the chlorine of the muriatic acid unites with one atom of mercury, forming bichloride of mercury, as represented in the following diagram:

| | | | |
|---|---|---|---|
| 74 Muriatic Acid, (two equiv.) | Hydrogen | 1 | 27 Prussic Acid. |
| | Hydrogen | 1 | 27 Prussic Acid. |
| | Chlorine | 36 | |
| | Chlorine | 36 | |
| 252 Bicyanide of Mercury | Cyanogen | 26 | |
| | Cyanogen | 26 | |
| | Mercury | 200 | 272 Bichloride of Mercury. |

The two equivalents of prussic acid rise in vapour with a quantity of the water present, and condense in the receiver. In the retort there remains corrosive sublimate in solution, part of which, as the liquor cools, is deposited in crystals.

The use of prussic acid in medicine has been much restricted by the difficulty of procuring it of uniform strength; sometimes it has

proved too strong, and has given so violent a shock to the nervous system as to prove fatal; more frequently it is so weak from decomposition as to produce no effect. This irregularity has arisen chiefly from preparing the acid in too concentrated a state, when it rapidly suffers chemical change. The present formula given by the Dublin College is intended to form a very weak acid, which will be more likely to be permanent and uniform; 100 grains of it contain 1.6 of real acid, and should dissolve 6.4 grains of red oxide of mercury. This test of dissolving a certain quantity of oxide of mercury was proposed by Dr. Ure, as a better criterion of the strength of prussic acid than the specific gravity, which he has shewn to alter little where the degree of concentration has varied very much. The medicinal application of prussic acid has been already considered, (page 72.)

Acidum sulphuricum purum. Pure Sulphuric Acid. Dub.

"Take of Commercial Sulphuric Acid, one pound. Put it into a retort of white glass, to which there is adapted without lute a receiver of the same kind. Let heat be applied to the retort until a twelfth part of the liquor come over, which is to be rejected, as containing too much water. The receiver being replaced, the residuum is to be distilled to dryness. A few slips of platinum put into the retort will moderate the ebullition, which otherwise might be too violent. The specific gravity of this acid is 1845. Let the acid be kept in well-closed vessels."

The preparation of Sulphuric Acid being carried on, on a large scale, for the purposes of commerce, no process is given for it in any of the Pharmacopœias, nor could it be executed in the shops. As prepared in the manner which has been already described, (p. 157.), it is not perfectly pure. It contains a quantity of sulphate of potash, (the acid combining with a portion of the potash of the nitre,) and sometimes a small portion of sulphate of lead, derived from the action of the acid on the lead of the chamber. It is often also coloured of a brownish tinge, from small portions of vegetable matter accidentally introduced into it, which it chars or decomposes, and their carbon gives it this hue; this change is of little consequence, as it impairs none of the properties of the acid. The sulphate of lead is the only impurity of any importance, and it, whenever the sulphuric acid is diluted, (as it always is for medical purposes,) is precipitated, being insoluble in the dilute acid. There is therefore no necessity for this process to purify it inserted into the last Dublin Pharmacopœia, a process which is besides of so troublesome a nature, that the apothecary will never think of practising it. Nor is there any advantage in increasing the state of concentration of the acid, for there is no pharmaceutic use to which it is applied where the presence of a little water, more or less, is of any consequence. In the distillation of sulphuric acid, it is requisite to heat the fluid up to 620°, and the boiling which commences is irregular and violent; the slips of platinum render the ebullition more moderate, by presenting heated surfaces, from which small bubbles arise; but even with these the glass vessels are broken so frequently, that manufac-

turers find it economical in the end to employ vessels of platina, though their original cost be great.

Acidum sulphuricum dilutum. Diluted Sulphuric Acid. Ed.

"Take of Sulphuric Acid, one part; Water, seven parts. Mix them."

Acidum sulphuricum dilutum. Diluted Sulphuric Acid. Dub.

"Take of Pure Sulphuric Acid, one part; Distilled Water, seven parts. Add the acid gradually to the water. The specific gravity of this acid is 1084."

Acidum sulphuricum dilutum. Diluted Sulphuric Acid. Lond.

"Take of Sulphuric Acid, a fluid-ounce and a half; of Distilled Water, fourteen fluid-ounces and a half. Add the acid gradually to the water; then mix them."

The intention of this formula is to afford an acid sufficiently dilute to admit of its dose being easily regulated. The London College have, without any necessity, altered the proportions both from those of the other Pharmacopœias, and from those which had formerly been ordered in their own Pharmacopœia. Instead of the proportion of one to nine, which they ordered before, they now direct the proportion by weight, of one part of acid to nearly five and a half of water. The reason given for this change is, "that the mixture will be more conveniently made, and its dose more easily apportioned, than that of the former Pharmacopœia," a reason in which there is no propriety. A mixture of sulphuric acid with water is made just as easily in one proportion as in another, and the dose of the diluted acid, whatever may be its strength, is apportioned with equal facility. Nor is it of any importance to have any relation between the dose of the diluted acid and any particular quantity of the concentrated acid, as the acid in the latter state has never been prescribed internally. It is to be regretted that the strength of a preparation, which has for a considerable period been employed in medical practice, has been thus unnecessarily changed. In the Edinburgh and Dublin Pharmacopœias the proportion is even a more convenient one, if this is to be regarded, being one part of strong acid in eight in the mixture, or a drachm in an ounce. According to Mr. Phillips, 100 grains of the London dilute acid saturate 50, and a fluid-drachm 31 grains of the crystallized subcarbonate of soda.

Some care is required in mixing water and the strong acid in glass vessels, for their capacity for caloric being diminished by their combination, a considerable extrication of heat takes place; if the mixture be made hastily, the temperature will rise even to 300° of Fahrenheit, or considerably higher than the boiling point of water; glass vessels are by this sudden heat very often broken; the mixture should therefore be made slowly and cautiously, the acid being added in successive portions to the water, and the mixture agitated after each addition. This acid, as has been mentioned, is an excellent tonic and astringent.

Acidum tartaricum. Tartaric Acid. Lond.

"Take of Supertartrate of Potash, two pounds and a half; Boil-

ing Distilled Water, three gallons; Prepared Chalk, a pound; Sulphuric Acid, a pound. Boil the supertartrate of potash in two gallons of distilled water, and add gradually the prepared chalk until effervescence is no longer excited; put it aside that the tartrate of lime may subside; pour off the liquor, and wash the tartrate of lime repeatedly with distilled water until it come away tasteless. Then pour upon it the sulphuric acid diluted with a gallon of boiling distilled water, and put aside for twenty-four hours, occasionally shaking it. Strain the liquor and evaporate in a water-bath till crystals are formed."

Acidum tartaricum. Tartaric Acid. Dub.

"Take of Bitartrate of Potash in powder, ten parts; Prepared Chalk, four parts; Sulphuric Acid, seven parts; Water, one hundred and twenty parts. Mix the bitartrate of potash with one hundred parts of the water boiling hot, and add gradually the prepared chalk. Then after the effervescence has ceased, pour off the clear liquor. Wash the tartrate of lime which remains until it become tasteless. Add to the clear liquid which was poured off as much of a solution of muriate of lime as may be sufficient to throw down all the tartrate of lime. Wash this also with water, and mix it with the former precipitate. Then add the sulphuric acid diluted with twenty parts of water, and digest the mixture in a moderate heat for three days, frequently shaking it. Pour off the clear acid liquor, and wash the acid out of the sediment. Let these liquors with the first acid liquor and the washings be evaporated by a gentle heat till crystallization takes place. Purify the crystals by repeated solutions and crystallizations, and keep them in a close glass vessel."

These two processes are framed on the same principle to obtain the tartaric acid, but that of the Dublin College is more complete. The salt employed in both, bitartrate of potash, consists of one equivalent of potash, and two of tartaric acid. When this is dissolved in water, and carbonate of lime or chalk added, the excess of tartaric acid expels the carbonic acid, and unites with the lime, forming tartrate of lime, while the remainder of the tartaric acid continues in union with the potash in the state of neutral tartrate of potash. This reaction is represented in the following diagram:

| | | |
|---|---|---|
| 50 Carbonate of Lime | Carbonic Acid 22 | 22 Carbonic Acid. |
| | Lime . . . . 28 | 94 Tartr. of Lime. |
| 180 Bitartr. of Potash | Tartaric Acid 66 | |
| | Tartaric Acid 66 | |
| | Potash . . . . 48 | 114 Tartr. of Potash. |

The tartrate of lime being nearly insoluble is precipitated; it is washed from any intermixture of tartrate of potash and decomposed by sulphuric acid, which attracts the lime from the tartaric acid; the latter remains in solution, and upon evaporation crystallizes. So far the processes agree; but it is obvious, that only one-half of the acid in the original bitartrate of potash has been procured, the rest remaining in the state of neutral tartrate of potash; to obtain this portion also, the Dublin College order muriate of lime to be added to the solution from which the first precipitate has been separated.

Double decomposition ensues, the muriatic acid leaves the lime and combines with the potash, the tartaric acid unites with the lime, and forms a second portion of tartrate of lime, as represented below.

| | | | |
|---|---|---|---|
| 114 Tartrate of Potash | Potash . . . . 48 | | 85 Muriate of Potash. |
| | Tartaric Acid. 66 | | |
| 65 Muriate of Lime | Muriatic Acid 37 | | |
| | Lime . . . . . 28 | | 94 Tartrate of Lime. |

The two precipitates of tartrate of lime are put together, and decomposed by the sulphuric acid as already stated. In the Dublin process, therefore, twice as much tartaric acid is procured from the same weight of cream of tartar as by the London formula. The latter, however, may be made equally economical in another way, by using evaporation so as to procure the neutral tartrate of potash, a salt of some utility in medicine, and to obtain which there is even a separate process, that may thus be rendered unnecessary.

In the Dublin process an excess of chalk is used, which is found necessary to precipitate all the tartaric acid, and the quantity of sulphuric acid is a little below what is requisite for the complete decomposition of the tartrate of lime, to insure its being fully neutralized, as otherwise it might in the evaporation react on the tartaric acid and char it.

Tartaric acid crystallizes in prisms, soluble in 5 parts of cold water; the solution has a very sour taste. The acid is used for the same purposes as citric acid, and being cheaper, is often substituted for it, (p. 275.)

Carbonas potassæ. Carbonate of Potash. Ed.

"Take of Pure Subcarbonate of Potash, two parts; Water, three parts. Dissolve the salt in the water, and expose it in a proper apparatus to a stream of carbonic acid gas. Strain the solution when it no longer absorbs the acid, and then evaporate by a heat of not greater than 180°, so as to obtain crystals. Carbonic acid is easily obtained from equal weights of carbonate of lime and sulphuric acid freely diluted with water.

Potassæ carbonas. Carbonate of Potash. Lond.

"Take of the Liquor of Subcarbonate of Potash, a gallon. Transmit Carbonic Acid Gas through the liquor of Subcarbonate of Potash in a proper vessel till it is fully saturated, and strain. Let the strained liquor be evaporated that crystals may form, taking care that the heat shall not exceed 120°. After the liquor is poured off, dry these crystals on bibulous paper. Carbonic Acid is most easily obtained from white marble and dilute sulphuric acid."

Potassæ bicarbonas. Bicarbonate of Potash. Dub.

"Take of Purified Pearl-ashes, one part; Distilled Water, two parts. Dissolve and transmit through the solution, in a proper apparatus, a stream of carbonic acid gas, (which is evolved when white marble is dissolved in dilute muriatic acid,) until the liquor become turbid. Then filter, and expose it again to the stream of carbonic acid gas until the alkali be saturated. Lastly, let it remain in a cool place until it form crystals, which are to be dried without heat, and kept in a close bottle."

In this process a stream of carbonic acid gas is passed through a solution of subcarbonate of potash; the salt attracts a second equivalent of the acid, and bicarbonate of potash is formed, which is obtained by crystallization. The mode of disengaging the carbonic acid gas recommended by two of the Colleges is not a convenient one, for the insoluble sulphate of lime is formed in a crust round the pieces of marble, and greatly impedes the action of the sulphuric acid. Diluted muriatic acid is preferable on this account, the muriate of lime formed is dissolved as rapidly as it is produced, and fresh surfaces of the marble are constantly presented to the acid. The chief objection is, that some of the fumes of the muriatic acid may be evolved with the carbonic acid gas, and may form a muriate of potash; but of this there is little risk if the acid be largely diluted. It is also rather a more expensive acid than the sulphuric; but, as Mr. Phillips remarks, the same quantity may be repeatedly used, as the greater part of it may be recovered from the solution of muriate of lime by adding sulphuric acid, which, by forming an insoluble sulphate, removes the lime.

The solutions of subcarbonate of potash, directed by the Colleges to be used in this process, have been supposed to be of too great strength. The proportions in the Edinburgh Pharmacopœia are two parts of the subcarbonate to three of water; and those of the London are still larger, being not far from equal parts of each. Now bicarbonate of potash, the salt which is to be formed, is much less soluble in water than the subcarbonate; it requires fully four times its weight of water to dissolve it; in crystallizing also, it unites with a considerable portion of water. Hence, instead of evaporation being necessary for obtaining it in crystals, there is little more than one-fifth of the water present necessary for its solution. Mr. Phillips recommends that a solution should be employed of one pound of subcarbonate of potash in five times its weight of water. There is, however, no necessity for altering the proportions, the only inconvenience in using them being, that the bicarbonate is deposited in crystals during the process, and may stop up the tubes if they are not examined and cleared. On the great scale it is found, that proportions not very different from those given by the Edinburgh College may be used with advantage. The filtration ordered by the Colleges is to remove a portion of silica, which is combined with the alkali in potashes, and is deposited when the alkali combines with the carbonic acid. The filtration should be performed, as the Dublin College direct, before the alkali is so far saturated as to deposit crystals of bicarbonate.

The bicarbonate of potash crystallizes in quadrangular prisms, which are not deliquescent; they contain one equivalent of water of crystallization. The taste of this salt is mild, but somewhat alkaline, and it changes the vegetable colours, in a slight degree, to a green, or the acid is scarcely able completely to neutralize the powers of the alkali. It contains exactly twice the quantity of carbonic acid of the common carbonate, and is hence distinguished by the name bicarbonate. It may be remarked, that the nomenclature of the alkaline carbonates in the Pharmacopœias is very perplexed.

The London and Edinburgh Colleges use the old names of subcarbonate and carbonate, the Dublin College the terms, more correct in a scientific point of view, of carbonate and bicarbonate. The term "carbonate" is thus applied by the Colleges to different salts. To avoid confusion it is best not to employ the ambiguous term of carbonate at all, but to use the names of subcarbonate and bicarbonate, respecting which there can be no mistake. The medicinal properties of bicarbonate of potash have been already considered, (p. 260, 267.)

SUBCARBONAS POTASSÆ. Subcarbonate of Potash. Ed.

"Let Impure Subcarbonate of Potash be put in a crucible and exposed to a red heat, then triturate it well with an equal weight of water. The liquor, after the impurities have subsided, being poured into a clean iron pot, is to be boiled to dryness, stirring the salt constantly towards the end of the boiling that it may not adhere to the vessel."

POTASSÆ SUBCARBONAS. Subcarbonate of Potash. Lond.

'Take of Impure Potashes in powder, three pounds; of Boiling Water, three pints and a half. Dissolve the potashes in the water, and strain; then pour it into a clean iron vessel, and dissipate the water by a gentle heat, so that the liquor may become thick; afterwards having withdrawn the fire, stir it constantly with an iron spatula until the salt pass into small grains.

"Subcarbonate of potash may be prepared in the same manner from tartar, which has been first burnt, until it be of a grey colour."

POTASSÆ CARBONAS E LIXIVIO CINERE. Carbonate of Potash from Potashes. Dub.

"Take of Potashes in coarse powder, Cold Water, of each one part. Mix by rubbing them together, and macerate for a week in an open vessel, stirring occasionally; then strain the ley, and evaporate to dryness in a very clean silver or iron vessel, stirring the saline mass constantly towards the end of the evaporation with an iron spatula. When reduced in this manner to a coarse powder, let it be kept in close vessels. Before dissolving the potashes in water, if they are very impure, let them be calcined in a crucible until they become white."

THE Potashes and Pearl-ash of commerce are obtained by the incineration of the wood of land vegetables; the ashes being lixiviated with water, so as to dissolve the saline matter, and this being evaporated to dryness. The dry mass consists principally of subcarbonate of potash, with smaller quantities of sulphate and muriate of potash, siliceous earth, and metallic matter, principally oxides of manganese and iron. These are in a great measure abstracted by the above process, the subcarbonate of potash, from its greater solubility, being dissolved, while the others, especially the earthy and metallic matter, from the small quantity of water employed, remain undissolved. In the evaporation vessels of silver or iron are used, because the alkali acts on glass, and does not act on these metals.

This salt is commonly named a subcarbonate, because it changes the vegetable colours to a green, and has the general alkaline pro-

perties; but as it consists of one equivalent of acid and one of alkali, it is, in strict chemical nomenclature, termed the carbonate of potash, its alkaline character arising not from deficient quantity of the carbonic acid, but its weak acidity, whence it is unable to neutralize completely the potash. Subcarbonate of potash is acrid (p. 217,) and deliquescent, soluble in an equal weight of water, but insoluble in alcohol. It is employed principally in the preparation of saline draughts, 20 grains of it saturating about half a fluid-ounce of lemon juice, and in the formation of the following solution:

Liquor potassæ subcarbonatis. Liquor of Subcarbonate of Potash. Lond.

"Take of Subcarbonate of Potash, a pound; Distilled Water, twelve fluid-ounces. Dissolve the subcarbonate of potash in the water, and strain through paper."

Potassæ carbonatis aqua. Water of Carbonate of Potash. Dub.

"Take of Carbonate of Potash from Crystals of Tartar, one part; Distilled Water, two parts. Dissolve and filter. The specific gravity is 1320."

The first of these solutions has a sp. gr. of 1446, the second is weaker and purer. Owing to their nauseous taste they are rarely given internally, the bicarbonate of potash or soda being preferred; they are used chiefly in pharmacy.

Subcarbonas potassæ purissimus. Pure Subcarbonate of Potash. Ed.

"Take of Impure Supertartrate of Potash, any quantity. Having wrapped it up in moist bibulous paper, or put it into a crucible, burn it into a black mass, by placing it among live coals. Having reduced it to powder, subject it to a moderate heat, in an open crucible, until it become white, or at least of an ash-grey colour, care being taken that it do not melt. Then dissolve it in warm water; strain the liquor through linen, and evaporate it in a clean iron vessel, stirring the matter constantly, towards the end of the evaporation, with an iron spoon, that it may not adhere to the bottom of the vessel. A very white salt will remain, which is to be left a little longer on the fire, until the bottom of the vessel is at nearly a red heat. When cold, it is to be kept in glass vessels well stopt."

Potassæ carbonas e tartari crystallis. Carbonate of Potash from Crystals of Tartar. Dub.

"Take of Crystals of Tartar, any quantity. Expose it to a red heat in a silver crucible lightly covered, until it cease to emit vapours. Reduce the residual matter into coarse powder, and calcine it in the same crucible without a cover for two hours, stirring it constantly. Then boil it with twice its weight of water for a quarter of an hour, and, after sufficient subsidence, pour off the pure liquor. Let this be done three times. Strain the mixed liquors, and evaporate in a silver basin; bring the residual salt, as it becomes dry, into grains by frequent agitation; then expose it to a low red heat; remove it from the vessel before it is entirely cold, and keep it in phials well stopt."

By exposing supertartrate of potash to heat, the tartaric acid is decomposed. Part of its carbon and oxygen unite and form carbonic acid, which is extracted by the potash ; and, by continuing the heat, the remaining carbonaceous matter and hydrogen are burnt out. The supertartrate of potash of commerce usually contains a little tartrate of lime, which by the heat is converted into carbonate of lime ; but by dissolving the saline matter in water, this and any other earthy substances are separated, and, by evaporation, a salt is obtained, which, like the former, is a subcarbonate of potash, but more pure. The process, however, being more expensive than the preceding one, the product of it is not often to be found in the shops.

Aqua potassæ. Water of Potash. Ed.

"Take of newly prepared Lime, eight ounces ; Subcarbonate of Potash, six ounces ; Boiling Water, twenty-eight ounces. Pour over the lime, in an iron or earthen vessel, twenty ounces of the water. The ebullition being finished, immediately add the salt, dissolved in eight ounces of water ; and the whole being well mixed, close the vessel until they become cold. Let the cold materials, previously well agitated, be poured into a glass funnel, the tube of which is obstructed with clean linen. Cover the upper orifice of the funnel, while the neck of it is inserted in another glass vessel, so that the water of potash may gradually drop through the linen into the lower vessel. When it first ceases to drop, pour into the funnel a few ounces of water, but cautiously, so that it may swim above the matter in the funnel. The water of potash will again begin to drop. In this manner, the affusion of water is to be repeated until three pounds have filtered, which will be in the space of two or three days. The upper parts of the liquor are finally to be mixed with the lower by agitation, and it is to be kept in a vessel well stopt."

Liquor potassæ. Liquor of Potash. Lond.

"Take of Subcarbonate of Potash, a pound ; Newly Prepared Lime, half a pound ; of Boiling Distilled Water, a gallon. Dissolve the potash in two pints of the water. Add to the lime what remains of the water. Mix the liquors together while hot, then put them into a covered vessel, and, after they are cold, strain through cotton cloth. If any diluted acid dropt in excite effervescence, it is necessary to add more lime, and again strain. A pint of this liquor ought to weigh sixteen ounces."

Potassæ causticæ aqua. Water of Caustic Potash. Dub.

"Take of Carbonate of Potash from Potashes of Commerce, Lime recently calcined, of each two parts ; Water, fifteen parts. Sprinkle on the lime in an earthen vessel one part of hot water, and, when slaked, mix the salt with it and add the rest of the water ; put the mixture as soon as it has cooled into a well-closed bottle, and keep it three days with frequent agitation. When the carbonate of lime shall have subsided, let the clear liquor be poured off, and kept in bottles of green glass very well closed. Its sp. gr. is 1080."

In this process the lime abstracts the carbonic acid from the potash : it is difficult, however, to abstract it entirely, and hence the necessity for the peculiar arrangement employed, in which a large

quantity of lime is used, and in which it is made to act in the most favourable manner by putting the mixture into a funnel, the tube of which is nearly obstructed, so that the alkaline solution must filtrate slowly through the mass of lime. The affinity of the lime to the carbonic acid is thus aided, and the greater part of the acid is abstracted from the potash. Still, however, from the effect of quantity on the force with which affinity is exerted, a small quantity is retained in combination with the potash, which cannot be abstracted by this process. But if the lime has been in a sufficiently active state, and the directions duly observed, so that the filtration has been performed slowly, it is very inconsiderable, as is apparent from scarcely any sensible effervescence being excited by the addition of an acid, and for any medicinal or pharmaceutical purpose to which the solution is applied may be neglected. By the process of the London College the product is less perfect, both from the proportion of lime being much too small, and from no peculiar arrangement being employed to favour its action. The agency of the air must be excluded during the filtration, especially from the filtered liquid, to prevent absorption of carbonic acid, which may be done by placing a plate of glass on the funnel. A better mode was contrived by Dr. Duncan, of using a funnel closed above, with a small tube passing down the throat of the funnel into the bottle below, which allows the air to come up from the bottle, as the liquor filters into it. (See a figure of this in Dr. Reid's Practical Chemistry, p. 230.) It is not easy to find a porous substance for closing the throat of the funnel, and which will not be acted on by the alkali. Gravel or coarse sand is commonly used.

The process given in the last Dublin Pharmacopœia differs in several respects from that prescribed by the other Colleges. In this the solution of subcarbonate of potash, instead of being filtered through lime, is kept three days in contact with it in a closed bottle, a method which Dr. Barker found to deprive the alkali more completely of carbonic acid than mere filtration. He has shewn also that it is proper to employ a much larger proportion of water than is ordered by the Edinburgh College, and from this contributing so much to the efficiency of the process, has conjectured that it is only the lime which is dissolved that acts in abstracting the carbonic acid. The Dublin process has certainly the advantage of being easily performed, and affords a pure alkali; but that of the Edinburgh College yields it in a more concentrated state, whence the evaporation in the next process to procure potash in a solid state will be less tedious.

Solution of potash must be kept in green bottles, as it acts on white glass, and these must be well closed to prevent it attracting carbonic acid from the air. Its medicinal applications have been already considered. It is commonly employed as a lithontriptic, administered internally, (p. 267,) or injected dilute and tepid into the bladder, according to the method of Fourcroy, (p. 266). Its use is indicated when a copious red sediment is deposited from the urine. Mr. Brandish has recommended it to be given in scrofula, in doses

of one to three or four drachms by measure, with a little oil of juniper. In lepra and psoriasis, connected with acidity in the primæ viæ, it has been found useful; and it has been applied externally, much diluted with water, as a stimulus in rachitis, gouty swellings, and gonorrhœa.

POTASSA, *olim Causticum Commune Acerrimum.* Potash. Ed.

"Take of Water of Potash, any quantity. Evaporate it in a covered clean iron vessel, until, when the ebullition is finished, the saline matter flows smoothly like oil, which will happen before the vessel is at a red heat. Then pour it on a clean iron plate; cut it into small masses before it hardens, and immediately put them into a phial well stopt."

POTASSA FUSA. Fused Potash. Lond.

"Take of Liquor of Potash, a gallon. Evaporate the water in a clean iron vessel, until the ebullition ceasing, the potash liquefies; then pour it upon an iron plate into proper moulds."

POTASSA CAUSTICA. Caustica Potash. Dub.

"Take of Water of Caustic Potash, any quantity. Evaporate it in a very clean iron vessel, until the ebullition having ceased, the saline matter, on increasing the heat, remains nearly tranquil in the vessel. Pour out this melted salt on an iron plate, and while it is becoming concrete, cut it into proper pieces, which put immediately into a phial well stopt.

"During the evaporation, the operator should avoid the drops of liquid thrown out from the vessel."

BY the dissipation of the water in this process, the alkali is obtained in a solid form, though it still retains a quantity of water in intimate combination: it is usually run into moulds, so as to be formed into cylindrical pieces. It should be evaporated as rapidly as possible, that it may not absorb carbonic acid from the atmosphere. Under this form it is used as a caustic; it quickly erodes animal matter, and, mixed with soap into a paste, is sometimes used to open an ulcer. It has the disadvantage, however, of deliquescing rapidly, and being hence liable to spread.

POTASSA CUM CALCE, *olim Causticum Commune Mitius.* Potash with Lime. Ed. Dub.

"Take of Water of Potash, any quantity. Evaporate it to one-third, (one-fourth, Dub.) in a covered iron vessel; then mix with it as much newly slaked lime as may be sufficient to give it the consistence of a solid paste, which is to be kept in a stopt vessel."

POTASSA CUM CALCE. Potash with Lime. Lond.

"Take of the Liquor of Potash, three pints; of newly Prepared Lime, a pound. Boil the liquor of potash to a pint; then add the lime slaked by the water having been poured upon it, and mix them carefully."

As a caustic, this is milder than the former preparation, and it is less deliquescent, so that it can be more easily confined to the part to which it is applied. When mixed, however, with the requisite quantity of soap to form a paste, it is scarcely sufficiently active.

Aqua supercarbonatis potassæ. Water of Supercarbonate of Potash. Ed.

"Take of Water, ten pounds; Pure Subcarbonate of Potash, one ounce. Dissolve, and expose the solution to the current of Carbonic Acid Gas, which arises from three ounces of Powder of Carbonate of Lime, three ounces of Sulphuric Acid, and three pounds of Water, gradually and cautiously mixed. The chemical apparatus invented by Dr. Nooth is well adapted to this preparation. But, if a larger quantity of the solution is required, an apparatus which gives sufficient pressure will be necessary. It ought to be kept in vessels well stopt."

Potash, when used as a lithontriptic, excites so much irritation in the stomach and bladder, that its use cannot be long continued. But, when supersaturated with carbonic acid, as it is in this preparation, it is rendered more pleasant and less irritating; and though its lithontriptic or real solvent power is diminished, it is capable of acting as a palliative, and of being continued for any length of time. From the observations already made under the class of lithontriptics, it follows, that no greater benefit is to be expected from the use of alkaline remedies under any form, and that this has even some peculiar advantages. It is taken to the extent of one, or even two pounds, in the day. It affords also a grateful antacid, and it often also proves diuretic. A solution of this kind has been in use for a considerable time; and, to establish uniformity in its strength, it is inserted by the Edinburgh College as an officinal preparation. When properly prepared, it is pungent and acidulous, and sparkles when poured into a glass. By employing an apparatus, in which strong mechanical pressure can be applied, the solution may be still more impregnated with carbonic acid: it is thus rendered more grateful, and as an antacid, in particular, is perhaps rendered more effectual, the stimulus of the carbonic acid relieving the uneasy sensations connected with acidity of the stomach, while the alkali neutralizes the acid. It is often prepared in the shops with too small a quantity of alkali.

Acetas potassæ. Acetate of Potash. Ed.

"Take of Pure Subcarbonate of Potash, one pound; Weak Acetic Acid, as much as is necessary. Boil it with a gentle heat in five pounds of the acid, and add more acid at different times, until, on the watery part of the former portion being nearly dissipated by evaporation, the acid newly added excite no effervescence: this will happen when about twenty pounds of acid have been consumed. Afterwards evaporate to dryness slowly. Let the remaining impure salt be liquefied with a gentle heat, for a short time, but not too long; then dissolved in water, and strained through paper. If the liquefaction has been properly done, the strained liquor will be limpid; if not, of a brown colour. Afterwards evaporate with a very gentle heat this liquor, in a shallow glass vessel, so that when removed from the fire it may form a crystalline mass. Lastly, the acetate of potash ought to be kept in vessels well closed."

Potassæ acetas. Acetate of Potash. Lond.

"Take of Subcarbonate of Potash, a pound; Strong Acetic Acid,

two pints; Boiling Distilled Water, two pints. Add the acid previously mixed with the water to the Subcarbonate of Potash, till effervescence is no longer excited, and strain. Evaporate the liquor at first in a water-bath till the effervescence shall have ceased. Then expose it to a heat gradually increased, and again evaporate till a pellicle appears at the surface; remove this pellicle, and dry it on bibulous paper. Let the liquor be repeatedly evaporated, and remove in the same manner the pellicles and dry them."

Potassæ acetas. Acetate of Potash. Dub.

"Take of Carbonate of Potash, from Crystals of Tartar, any quantity. Add to it, at different times, of Distilled Vinegar, moderately heated, five times its weight. When the effervescence has ceased, and the liquor has been partly evaporated, add again at intervals, Distilled Vinegar until the mixture ceases to effervesce; the evaporation being continued, a dry salt will be produced, which, increasing the heat a little, liquefy cautiously. Dissolve it when cold in water, strain the liquor, and boil it down, until, when removed from the fire, in cooling it pass into a mass of crystals perfectly white. Put these immediately into phials well stopt."

In this process, the acetic acid of the distilled vinegar combines with the potash, disengaging the carbonic acid. According to Mr. Phillips, rather more than 21 pints of distilled vinegar of the sp. gr. 1.007 are required to saturate 18 ounces of subcarbonate of potash. The acetate of potash, obtained by the evaporation, is liable to be of a brownish colour, from the presence of a little extractive matter, derived from the vinegar, which is rendered of a dark colour by the potash; to prevent this, it is proper to have a slight excess of acetic acid present in the evaporation. The salt may also be freed from this colour, either by boiling the solution with charcoal powder, or, as directed in the Pharmacopœia, by melting the salt; and, by the second solution and evaporation, it is obtained in the form of a white foliated mass; the foliated structure, which is very characteristic of it, arising from a species of crystallization. In the process now given in the London Pharmacopœia, the acetic acid procured from wood is employed as being free from the extractive matter. Hence the latter parts of the process are not required. The method of collecting the salt from the surface of the evaporating liquid is less convenient, but is chosen from the salt being scarcely crystallizable.

Acetate of potash is very deliquescent, becoming humid in a short time from exposure to the air. It does not require so much as half its weight of water for its solution, at the temperature of 60°: it proves diuretic and moderately laxative. Its dose is from a scruple to a drachm. A simple solution of subcarbonate of potash in vinegar is found equally efficacious. The salt is also used in some pharmaceutic processes.

Potassæ hydriodas. Hydriodate of Potash. Dub.

"Take of Iodine, one part; Sulphuret of Iron, in coarse powder, five parts; Sulphuric Acid, seven parts; Distilled Water, forty-eight parts; Solution of Carbonate of Potash, the quantity required; Rectified Spirit, six parts. Mix the iodine by trituration with sixteen

parts of the water, and put the mixture into a glass vessel. Pour upon the sulphuret in a matrass the acid previously diluted with thirty-two parts of the water; and by a tube adapted to the neck of the matrass, and reaching to the bottom of the glass containing the iodine and water, transmit the gas through the mixture until the iodine disappears. Filter the liquid, and immediately evaporate it at its boiling heat to one-eighth, and filter a second time. Then add gradually as much water of subcarbonate of potash as to saturate the acid, which is known by the effervescence ceasing. Expose the mixture to heat until a salt is left dry and of a white colour. Pour upon this the spirit, and dissolve it with heat. Lastly, pour off the liquor from the salt, evaporate it to dryness, and preserve the residuum in a well-stopped vessel."

In the first part of this process iodine is converted into hydriodic acid, by sulphuretted hydrogen gas being disengaged from sulphuret of iron, acted on by sulphuric acid, and this gas made to pass through water in which iodine is diffused. The iodine having a stronger affinity to hydrogen than sulphur has, takes it from the latter, and becomes hydriodic acid. The decomposition is known to be complete when the mixture loses its brown colour. To the fluid subcarbonate of potash is added, the alkali of which combines with the hydriodic acid forming hydriodate of potash, while the carbonic acid is evolved. The acid fluid is freed from the precipitated sulphur by filtering, and by rapid evaporation any remaining sulphuretted hydrogen is expelled. Subcarbonate of potash is then added, the hydriodic acid attracts the alkali, expelling the carbonic acid, and on evaporating to dryness, hydriodate of potash, or rather iodide of potassium, is procured. Lastly, the action of alcohol is employed to separate the hydriodate of potash, which is soluble in that fluid from the other salts present, (iodate and subcarbonate of potash,) which are insoluble in it.

The only part of this process involving reaction of a complicated kind is that of producing sulphuretted hydrogen. In that operation part of the water present is decomposed, its oxygen being attracted by the iron, which, when oxidated, combines with the acid, forming sulphate of iron, meanwhile the hydrogen of the water unites with the sulphur, forming sulphuretted hydrogen gas. These changes are represented in the following diagram:

9 Water { Hydrogen 1 → 17 Sulphuretted Hydrogen.
{ Oxygen 8
44 Sulphuret of Iron { Sulphur 16
{ Iron . . . 28
Sulphuric Acid . . . . . 40 → 76 Sulphate of Iron.

An easier method of forming hydriodate of potash is to add iodine to a solution of hydrosulphuret of potash; the iodine displaces the sulphur, uniting with the hydrogen and potash, with which that substance was combined, and on evaporation the salt crystallizes. Another process which succeeds well, is to heat together 50 parts of water, 10 of iodine, and 5 of iron; hydriodate of iron is formed, to which, after filtration, carbonate of potash is to be added, double

decomposition takes place, carbonate of iron being precipitated, and hydriodate of potash remaining in solution, which, by evaporation, is obtained in crystals.

Hydriodate of potash exists only in solution; when dry, it is iodide of potassium, according to the present views of the nature of iodine and chlorine. It is in cubic crystals, white, soluble in water, and to a greater extent in alcohol. It is often adulterated with carbonate of potash, a fraud which is easily discovered by the salt changing vegetable colours to green, and effervescing when any strong acid is poured upon it.

The medical use of iodine has been already considered, (p. 363); the present salt is a form in which frequently it is given. Thirty-six grains of the dry iodide are dissolved in an ounce of water, and of this solution from 5 to 20 drops are given twice in a day. Dr. Gardner prefers this solution to the tincture of iodine. "By its use," he says, "a soft bronchocele may be expected to be discussed in a month or six weeks; those which are old and hard will take a longer time, and will sometimes only suffer partial diminution." A solution of hydriodate of potash has the power of dissolving a quantity of iodine; and this ioduretted hydriodate of potash, prepared by dissolving 36 grains of the salt, and 10 grains of iodine in an ounce of water, was the form in which the remedy was principally given by Dr. Coindet. Its dose is from five to ten drops, thrice a-day in syrup, which may be gradually increased to twenty drops. Under this treatment, continued for some weeks, the goitre will commonly disappear. When the pulse becomes quick, the patient loses flesh rapidly, accompanied by palpitation, a dry cough, and want of sleep, with increased appetite in some, the goitre will be observed to diminish; the medicine should then be intermitted for a day or two, and resumed when the symptoms become milder.

The internal use of hydriodate of potash is assisted by applying at the same time to the enlarged gland the ointment formed with this substance, (Ung. hydr. potas.)

Potassæ nitras purificatum. Purified Nitrate of Potash. Dub.

"Take of Nitrate of Potash, one part. Dissolve it in two parts of boiling water, and set it aside to crystallize by cooling."

The object of this re-crystallization of nitre is, to free it from small portions of muriates of potash and soda, oxides of iron and manganese and silica, which are commonly present in it. For the pharmaceutical purposes to which nitre is applied, this purification is scarcely requisite, and there is a loss of part of the nitre retained in solution by the cold water. Nitre being soluble in an equal weight of boiling water, and four times its weight of cold water, in the above process half of the nitre employed must be lost, or by evaporation be obtained in a more impure state. If the process be worth retaining, equal weights of nitre and boiling water should be employed.

Sulphas potassæ. Sulphate of Potash. Ed.

"Dissolve the Acidulous Salt, which remains after the distillation of Nitrous Acid, in Warm Water, and after removing the superfluous acid by the addition of carbonate of lime, set it aside until the im-

purities subside; then pour off the fluid, filter it, and evaporate, so that crystals may be formed."

Potassæ sulphas. Sulphate of Potash. Lond.

"Take of the Salt which remains after the distillation of Nitric Acid, two pounds; of Boiling Water, two gallons. Mix them that the salt may be dissolved; then add of Subcarbonate of Potash, as much as will be sufficient to saturate the acid. Afterwards boil it until a pellicle appear on the surface, and when strained put it aside, that crystals may be formed. Having poured off the water, dry them on bibulous paper."

Potassæ sulphas. Sulphate of Potash. Dub.

"Dissolve the Salt which remains after the distillation of Nitric Acid, reduced to powder, in a sufficient quantity of boiling water; add as much carbonate of potash from potashes, as may be necessary to saturate the superfluous acid. The liquor being strained, evaporate it with a moderate heat, so that crystals may form."

The salt remaining after the distillation of nitrous acid, conducted according to the Edinburgh formula, is a mixture of sulphate and bisulphate of potash; the lime added neutralizes the excess of acid, and the neutral sulphate is procured by crystallization. In the process of the other Colleges for obtaining nitric acid, the salt remaining is bisulphate of potash alone; when to a solution of this subcarbonate of potash is added, one half of the sulphuric acid of the former salt unites with the potash, disengaging carbonic acid, and sulphate of potash is the product. The reaction is of the following kind:

| | | | |
|---|---|---|---|
| 70 Carbonate of Potash | Carbonic Acid | 22 | 22 Carbonic Acid. |
| | Potash | 48 | 88 Sulphate of Potash. |
| 128 Bisulphate of Potash. | Sulphuric Acid | 40 | |
| | Sulphuric Acid | 40 | |
| | Potash | 48 | 88 Sulphate of Potash. |

This is admitted by Mr. Phillips to be a less economical process than that of the Edinburgh College, the subcarbonate of potash used in it being a more expensive salt than the sulphate of potash which it is employed to form.

Sulphate of potash crystallizes in small prisms, which have a bitter taste; it acts as a cathartic, and is sometimes given in small doses (p. 203,) along with vegetable purgatives, when it is wished to employ a salt that does not act very quickly; for this salt being sparingly soluble, does not pass off so rapidly as the other saline cathartics.

Sulphas potassæ cum sulphure. Sulphate of Potash with Sulphur. Ed.

"Take of Nitrate of Potash in powder, Sublimed Sulphur, equal weights. Throw them, well mixed together, in small quantities at a time, into a red-hot crucible. The deflagration being finished, let the salt cool, and keep it in a glass phial, well stopt."

The nitrate of potash being decomposed at a red heat, affords oxygen to the sulphur, in such proportions as to convert it principally into sulphuric, and partly into sulphurous acid. Both acids are at-

tracted by the potash; and from the rapidity of the deflagration, a portion of the sulphur even escapes oxygenation, and remains united with a portion of the alkali in the state of sulphuret. This is therefore a mingled product. In its medicinal qualities it does not appear to differ much from the sulphate of potash; it is employed like it as an aperient, and its sulphurous taste and odour, when it is dissolved, give its solution some resemblance to the sulphureous saline mineral waters. Hence either alone, or mixed with sulphate of magnesia, it is sometimes used as affording an imitation of them. This process for preparing it is an expensive one, as much of the sulphur is lost, and the product is not more than half the weight of the materials.

POTASSÆ SUPERSULPHAS. Supersulphate of Potash. Lond.

"Take of the Salt which remains after the distillation of Nitric Acid, two pounds; Boiling Water, four pints. Mix them, so that the salt may be dissolved, and strain. Then boil the solution to one half, and put it aside that crystals may form. The liquor being withdrawn, dry these on bibulous paper."

POTASSÆ BISULPHAS. Bisulphate of Potash. Dub.

"Take of Sulphuric Acid of commerce, two parts; Carbonate of Potash from Potashes, as much as may be sufficient; Water, six parts. Let one portion of the sulphuric acid mixed with the water be saturated by the Carbonate of Potash; then let the rest of the acid be added, and evaporate the solution until it crystallize on cooling."

IN the first of these processes, the bisulphate of potash, which is the residual salt after the distillation of nitric acid, is obtained in crystals. The directions given are preferable to those in the former London Pharmacopœia, of evaporating till a pellicle forms, for, in that case, the whole concretes into a solid mass. In the Dublin process, the salt is formed by combining two equivalents of acid with the alkali of potashes; an expensive method, which will never be put in practice while the salt can be procured so readily in the former way. It is singular, that the Dublin Pharmacopœia, which has been so judiciously remodelled in the last edition, should have such processes introduced into it as the present, as that of distilling sulphuric acid, purifying nitre, and forming sulphate of magnesia.

Bisulphate of potash is more soluble than the sulphate, and less unpleasant in taste. It is sometimes used as a mode of administering sulphuric acid in combination with an aperient salt, and is advantageously conjoined with rhubarb.

"TARTRAS POTASSÆ. Tartrate of Potash. Ed.

"Take of Subcarbonate of Potash, one part; Supertartrate of Potash, three parts, or as much as may be necessary; Boiling Water, fifteen parts. To the subcarbonate of potash dissolved in the water, add, by small quantities, the Supertartrate of Potash rubbed to a fine powder, as long as it excites effervescence, which generally ceases before three times the weight of the subcarbonate of potash have been thrown in. Then strain the liquor, when cold, through

paper; and, after due evaporation, put it aside that crystals may form."

Potassæ tartras. Tartrate of Potash. Lond.

"Take of Subcarbonate of Potash, sixteen ounces; Supertartrate of Potash, three pounds; Boiling Water, a gallon. Dissolve the subcarbonate of potash in the water; then add the supertartra e of potash in powder until ebullition is no longer excited. Strain the liquor through paper; afterwards boil it until a pellicle appear, and put aside, that crystals may form. Having poured off the liquor, dry them on bibulous paper."

Potassæ tartras. Tartrate of Potash. Dub.

"Take of Carbonate of Potash from Potashes, five parts; Bitartrate of Potash, fourteen parts; Boiling Water, forty-five parts. To the carbonate of potash dissolved in the water, add gradually the bitartrate of potash, in fine powder. Evaporate the liquor strained through paper, and put it aside that crystals may form by cooling."

The excess of tartaric acid in the supertartrate of pot sh is in this process saturated by the potash of the carbonate of potash, and the neutral tartrate is formed. The following is the nature of the reaction:

| | | |
|---|---|---|
| 70 Carbonate of Potash | Carbonic Acid 22 | 22 Carbonic Acid. |
| | Potash ...... 48 | 114 Tartrate of Potash. |
| 180 Bitartrate of Potash. | Tartaric Acid 66 | |
| | Tartaric Acid . 66 | |
| | Potash ...... 48 | 114 Tartrate of Potash. |

The same salt is also sometimes procured by saturating the excess of acid in the bitartrate with lime, as represented in the diagram, p. 422. Taking into account two equivalents of water which are present in the bitartrate, the proportions of that salt, and of carbonate of potash, that should be employed in the present process, are nearly those of the Dublin Pharmacopœia. The neutral tartrate crystallizes in small tetrahedral prisms. It has a bitter taste, and requires four parts of cold water for its solution. From this greater solubility, compared with that of the supertartrate, it derived its name of Soluble Tartar: it is slightly deliquescent. The portion of alkali producing neutralization is retained by a very weak affinity: even the weaker acids decompose it partially, and reduce it to the state of supertartrate, a circumstance requiring to be attended to in combining it in prescriptions; most of the earthy salts also decompose it. Added to resinous purgatives, it is found to correct their griping quality. As a mild purgative, it is given in the dose of one ounce. It is recommended in cases of mania and melancholy.

Carbonas sodæ. Carbonate of Soda. Ed.

"Take of Subcarbonate of Soda, two parts; Water, three parts. Dissolve the salt in the water, and expose it to a stream of carbonic acid gas, until it cease to absorb any acid; then strain the liquor, and reduce it to crystals by evaporation, by a heat not greater than 180°.

"Carbonic acid is easily procured from equal weights of Carbonate of Lime in powder and Sulphuric Acid copiously diluted."

SODÆ CARBONAS. Carbonate of Soda. Lond.

"Take of Subcarbonate of Soda, a pound; Distilled Water, three pints. Dissolve the subcarbonate of soda in the distilled water. Then transmit carbonic acid through the liquor in a proper apparatus till it is fully saturated, and set aside that crystals may form. Dry the crystals, wrapt up in bibulous paper, and pressed. Evaporate the remaining liquor, taking care that the heat shall not exceed 120°, that crystals may again be produced. Press and dry these in the same manner."

SODÆ BICARBONAS. Bicarbonate of Soda. Dub.

"Take of Carbonate of Soda, two parts; Water, five parts. Dissolve. Expose the liquor in a proper apparatus to a stream of carbonic acid gas, evolved during the solution of white marble in dilute muriatic acid, until it ceases to absorb gas; let it rest until crystals form; then evaporate the liquor by a heat not exceeding 120°, and let crystals be formed by cooling, which are to be mixed with the former, dried and preserved in a close vessel."

SEVERAL methods have been employed to saturate carbonate of soda with carbonic acid; of these the Colleges have chosen the direct transmission of the acid gas through a solution of the carbonate, and it appears to be the most economical. From late experiments, however, it would seem, that the saturation is effected more speedily and completely, when the acid gas is transmitted over the dry effloresced salt, than when it is passed through the solution; and in that case the evaporation also is saved.

The salt contains, when properly prepared, two equivalents of carbonic acid, whence it is named bicarbonate. Mr. Phillips found, however, that much of the salt sold under this name is a sesquicarbonate. The bicarbonate of soda, though not perfectly neutral, is milder than the subcarbonate; it is therefore more grateful when used as an antacid dissolved in water; and from the larger quantity of carbonic acid it contains, it is also better adapted to the preparation of the effervescing draught. It is often prescribed as a lithontriptic.

SUBCARBONAS SODÆ. Subcarbonate of Soda. Ed.

"Take of Impure Subcarbonate of Soda, any quantity. Bruise it, and boil it in water until all the saline matter is dissolved. Strain the solution through paper, and evaporate it in an iron vessel, so that after cooling crystals shall form."

SODÆ SUBCARBONAS. Subcarbonate of Soda. Lond.

"Take of Impure Soda rubbed to powder, a pound; of Distilled Boiling Water, four pints. Boil the soda in the water for half an hour, and strain. Evaporate to two pints, and put aside that crystals may form. Reject the residual liquor."

CARBONAS SODÆ. Carbonate of Soda. Dub.

"Take of Barilla in powder, one part; Water, two parts. Boil the barilla in the water for two hours in a close vessel, agitating frequently; strain the liquor, and the residuum of the barilla being again rubbed, boil in an equal quantity of water; repeat this a third time. The leys being strained and mixed, are to be evaporated to dryness in an open iron vessel, taking care that the heat is not raised

so high as to liquefy the saline matter which remains; stir this with an iron spatula until it become white; lastly, dissolve it in boiling water, and after evaporating the liquor until it attain the specific gravity of 1220, expose it to the air when its temperature is nearly that of freezing water, that crystals may form in the cooling; these are to be dried and preserved in a stopped vessel. If the salt is not sufficiently pure, repeat the solution and crystallization."

The barilla of commerce, from which this salt is ordered to be prepared, is the residual matter of the combustion of marine plants. It is an impure subcarbonate of soda, containing large quantities of other saline and earthy matter, chiefly sulphate and muriate of soda, lime, magnesia, argil, hydriodate of potash, and silex, with charcoal. The subcarbonate of soda crystallizing readily, especially when cooled to 32°, the solution, on being evaporated, affords it nearly pure in the crystals which first form. The residual liquor, containing more of the other salts, ought to be rejected, a direction properly given in the formula of the London Pharmacopœia. From three to five ounces of the crystallized salt are obtained from a pound of barilla. The subcarbonate is now manufactured in such quantities, and so pure, by the decomposition of sulphate of soda, that these processes are almost unnecessary. Though mild to the taste, subcarbonate of soda is sensibly alkaline, and changes the vegetable colour to a green. Its crystals must be kept from the air, as they are efflorescent; they require not more than twice their weight of cold water for their solution; and by a heat inferior to that of 212° are liquefied by the action of the large quantity of water of crystallization (62.5 *per cent.*) they contain. The use of this salt as a lithontriptic has been already stated, and lately it has been highly recommended in hooping-cough, in doses of from ten grains to one drachm, given thrice a day; large doses of it have been recommended also in tic douloureux.

Sodæ carbonatis aqua. Water of Carbonate of Soda. Dub.

"Take of Carbonate of Soda, any quantity. Dissolve it in distilled water, so that its specific gravity shall be 1024. A solution of this strength is obtained by dissolving an ounce of Carbonate of Soda in a pint of distilled water."

An ounce of this solution (containing half a drachm of carbonate of soda) forms, with half an ounce of lemon juice, a pleasant effervescing draught.

Sodæ subcarbonas exsiccata. Dried Subcarbonate of Soda. Lond.

"Take of Subcarbonate of Soda, a pound. Submit it to the heat of boiling water in a clean iron vessel until it is perfectly dry, stirring it constantly with an iron spatula. Then rub it into powder."

Carbonas sodæ siccatum. Dried Carbonate of Soda. Dub.

"Liquefy the Crystals of Carbonate of Soda in a silver crucible placed on a fire: then increase the heat, and stir the melted salt, until by the evaporation of its water it becomes dry. This being rubbed to powder, is to be kept in close phials."

Subcarbonate of soda has been given as a lithontriptic, mixed with soap, under the form of pill, (p. 267). If the crystallized salt be used, besides the addition to its bulk from the water of crystallization, it effloresces, so that the pill prepared from it loses its cohesion. The dried subcarbonate is therefore preferable; and, from the moderate heat to which it is exposed in the drying, the water only is expelled, without any change in the composition of the salt. The London process expels only one-fourth of the water. This salt has been much recommended in various disorders of the urinary organs.

Aqua supercarbonatis sodæ. Water of Supercarbonate of Soda. Ed.

"This is to be prepared from ten pounds of Water, and two ounces of Subcarbonate of Soda, in the same manner as the Water of Supercarbonate of Potash."

Aqua carbonatis sodæ acidula. Acidulous Water of Carbonate of Soda. Dub.

"Take of Carbonate of Soda, any quantity. Dissolve it in water, so that each pint shall contain one drachm of carbonate of soda. Then, in an apparatus adapted for retaining the gas, subject it to a stream of carbonic acid gas, evolved during the solution of white marble in muriatic acid diluted with six times its weight of water, until carbonic acid be in excess in the liquor."

By the above process is formed a solution of bicarbonate of soda in water, highly impregnated with carbonic acid; it is known by the name of Soda Water, and is taken as a grateful refrigerant beverage, correcting acidity in the stomach, and sometimes used with advantage to obviate the excessive production of uric acid. It is manufactured on a great scale, the acid gas being condensed into the water by the action of a condensing syringe. The common soda powders, by their reaction, evolve an equal quantity of carbonic acid gas; but the salts produced are less agreeable than the bicarbonate of soda, and are not serviceable in correcting acidity.

Sodæ acetas. Acetate of Soda. Dub.

"Take of Carbonate of Soda, any quantity; Distilled Vinegar, as much as may be sufficient to saturate the alkali. Evaporate the filtered solution until it attain the specific gravity of 1276. By cooling let crystals form, which are to be carefully dried and kept in a close vessel."

According to Dr. Barker, crystallized subcarbonate of soda requires eleven times its weight of distilled vinegar for neutralization. The acetate of soda is obtained in striated prisms, white, with a sharp bitterish taste. Its medicinal quality is the same as that of acetate of potash, (p. 218), and it is more convenient for keeping, not being liable to deliquesce.

Tartras sodæ et potassæ. Tartrate of Soda and Potash. Ed.

"This is prepared from Carbonate of Soda and Supertartrate of Potash, in the same manner as Tartrate of Potash."

Soda tartarizata. Tartarized Soda. Lond.

"Take of Subcarbonate of Soda, twenty ounces; of Supertartrate of Potash in powder, two pounds; of Boiling Water, ten pints. Dissolve the subcarbonate of soda in the water, and gradually add the supertartrate of potash. Strain the liquor through paper, then boil it until a pellicle appear, and put aside that crystals may form. Having poured off the water, dry them on bibulous paper."

SODÆ ET POTASSÆ TARTRAS. Tartrate of Soda and Potash. Dub.

"Take of Carbonate of Soda, five parts; Bitartrate of Potash rubbed to a very fine powder, seven parts; Boiling Water, fifty parts. To the carbonate of soda dissolved in the water add gradually the tartar; the liquor being strained through paper, evaporate, and put it aside, that, on slow cooling, crystals may form."

THE excess of tartaric acid in the supertartrate of potash, being saturated in this preparation by the soda of the carbonate of soda, a double salt is formed, the Tartrate of Potash and Soda. The chemical re-action is the same as that represented, (p. 436,) carbonate of soda being substituted for carbonate of potash. From the experiments of Mr. Phillips and Dr. Barker, it appears that the quantity of supertartrate of potash ordered by the Edinburgh College is much too large. The proportion assigned by the Dublin College is more correct. This salt is used as a mild purgative, (p. 203,) and in the composition of Seidlitz powder, (p. 275).

PHOSPHAS SODÆ. Phosphate of Soda. Ed.

"Take of Bones, burnt to whiteness, and reduced to powder, ten pounds; Sulphuric Acid, six pounds; Subcarbonate of Soda, as much as may be necessary. Mix the powder in an earthen vessel with the sulphuric acid; then add nine pounds of water, and again mix them. Keep the vessel in the vapour arising from boiling water for three days; after which, dilute the matter, by adding other nine pounds of Boiling Water, and strain through a strong linen cloth; then pour over it gradually boiling water, until the whole phosphoric acid is washed out. Put aside the strained liquor, that the impurities may subside, from which pour it off, and, by evaporation, reduce it to nine pounds. To this liquor, again poured off from the impurities, and heated in an earthen vessel, add the Subcarbonate of Soda dissolved in warm water, until the effervescence cease. Then strain, and put it aside that crystals may form. These being removed, add, if necessary, to the liquor a little Subcarbonate of Soda, that the phosphoric acid may be exactly saturated; and prepare it, by evaporation, again to form crystals, as long as these can be produced. Lastly, let the crystals be kept in a vessel well stopt."

SODÆ PHOSPHAS. Phosphate of Soda. Dub.

"Take of Burnt Bones, beat to powder, ten parts; Sulphuric Acid, seven parts. Mix the powder with the sulphuric acid in an earthen vessel; add gradually seven parts of water, and stir the mixture. Digest for three days, adding occasionally more water, lest the matter become dry, and continue the stirring; then pour upon it seven parts of boiling water, and strain through a linen cloth, pouring on boiling water repeatedly, until the acid is entirely washed out. Put aside the liquor that the impurities may subside,

then pour it off pure, and reduce it by evaporation to one-half. Lastly, add of carbonate of soda, (dissolved in a sufficient quantity of warm water,) eight parts; strain, and, by repeated evaporation and cooling, form crystals, which are to be kept in a vessel well stopt. If the salt is not sufficiently pure, repeat the solution and crystallization."

The white residuum of burnt bones, after the gelatin has been consumed, consists chiefly of phosphate of lime. The sulphuric acid decomposes it, by combining with the lime; the decomposition, however, is only partial; the phosphoric acid which is disengaged, in conformity to the law of chemical attraction, which is observed in many cases of this kind, retaining a quantity of the lime combined with it, and forming a soluble compound; or a super-phosphate (or bi-phosphate) of lime, remains dissolved. When subcarbonate of soda is added to the acidulous liquor obtained by washing the materials, the soda combines with the excess of phosphoric acid, and the lime, retaining as much phosphoric acid in combination as forms neutral phosphate of lime, is precipitated; the phosphate of soda crystallizes on evaporation of the strained liquor. Its crystals are rhomboidal prisms, but they are obtained of a regular figure only if crystallizing with a light excess of alkali. Hence the liquor should be slightly alkaline; and from the tendency of the salt to crystallize with an excess of base, it is necessary, though the neutralization may have been perfect, to add, previous to the second crystallization, a little carbonate of soda, as directed in the formula of the Edinburgh Pharmacopœia. It is said that the salt may be prepared more economically by dissolving the phosphate of lime of the first part of the process in nitric acid, then adding sulphate of soda, when sulphate of lime will be precipitated, and phosphate of soda will remain dissolved with nitric acid; by distillation the nitric acid is recovered, and by solution in water and evaporation the residual phosphate of soda is obtained in crystals. The salt has been already described, (p. 204). Dr. Barker states, that he found it required five, not, as commonly said, three parts of water for solution. The composition of phosphate of soda has been given, p. 38, as being one equivalent of phosphoric acid, 28, and one of soda, 32=60. But it is to be remarked that at present the composition of all the phosphates is doubtful, as chemists are not assured that the atomic weights of phosphorus and phosphoric acid have been correctly ascertained; and it has been recently asserted, that instead of being 12 and 28, these are respectively 16 and 36. Phosphate of soda is an agreeable laxative, as having no unpleasant taste; it may be taken in soup, and not be distinguished from common salt.

Sulphas sodæ. Sulphate of Soda. Ed.

"Dissolve the acidulous Salt, which remains after the distillation of Muriatic Acid, in water; and add to it powdered Chalk, to remove the superfluous acid. Put it aside until the sediment subsides; then having poured off the liquor, and strained it through paper, reduce it by evaporation that crystals may be formed."

Sulphas sodæ. Sulphate of Soda. Lond.

"Take of the Salt which remains after the distillation of Muriatic Acid, two pounds; Boiling Water, two pints and a half. Dissolve the salt in the water; and add gradually of Subcarbonate of Soda, as much as will be sufficient to saturate the excess of acid. Boil until a pellicle appear, and when the liquor is strained, put it aside that crystals may form. Having poured off the water, dry them on bibulous paper."

SODÆ SULPHAS. Sulphate of Soda. Dub.

"Dissolve the Salt which remains after the distillation of Muriatic Acid in a sufficient quantity of boiling water. Put aside the strained liquor after due evaporation, that crystals may form by slow cooling."

IN the decomposition of muriate of soda by sulphuric acid, to prepare muriatic acid, more sulphuric acid is used than is necessary to saturate the soda, advantage being gained from its quantity adding to its affinity, as has been already explained; hence the necessity of removing the excess of acid in the residual mass, to obtain the neutral sulphate. In the Edinburgh Pharmacopœia, this is ordered to be done by carbonate of lime. The London College order the excess of acid to be neutralized by subcarbonate of soda, on the supposition of its being more economical, as increasing the quantity of salt; but from the price of the subcarbonate it is less so. Slaked lime is preferable to either, as it decomposes a little muriate of iron, which adheres to the salt. This salt is also obtained as a residuum in some other processes, particularly in the preparation on a large scale of muriate of ammonia, the Sal Ammoniac of commerce. It crystallizes in hexaedral prisms; they are efflorescent and soluble in rather less than three parts of cold water. Sulphate of soda has long been in use as a cathartic, (p. 202): it operates with sufficient power and certainty, but is liable to occasion nausea, from its very bitter taste. The sulphate of magnesia is usually substituted for it.

SUBCARBONAS AMMONIÆ. Subcarbonate of Ammonia. Ed.

"Take of Muriate of Ammonia, one part; Soft Carbonate of Lime dried, two parts. Each being separately reduced to powder, mix them, and sublime from a retort into a receiver kept cold."

AMMONIÆ SUBCARBONAS. Subcarbonate of Ammonia. Lond.

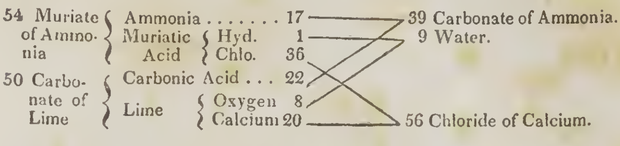
"Take of Muriate of Ammonia, a pound; Prepared Chalk dried, a pound and a half. Rub them separately to powder, then mix, and sublime with a heat gradually increased, until the retort is red."

CARBONAS AMMONIÆ. Carbonate of Ammonia. Dub.

"Take of Muriate of Ammonia, reduced to powder and well dried, Carbonate of Soda dried, of each one part. Put them mixed together into an earthen retort, and sublime the carbonate of ammonia, with a heat gradually raised, into a receiver kept cold."

IN this process, as given in the two first formulas, it may be supposed that the muriatic and carbonic acids exchange the bases with which they were combined, and that muriate of lime and carbonate of ammonia are the products. On the modern view of the nature of muriatic acid the changes are more complicated. The muriatic acid and lime decompose each other, the hydrogen of the former and oxygen of the latter uniting to form water, while the chlorine and

calcium enter into combination, the carbonic acid meanwhile combines with the ammonia, and the carbonate of ammonia is sublimed. The following diagram presents a view of these results :




The product obtained should be carbonate of ammonia, but the high temperature which it is necessary to apply causes a portion of ammonia to be dissipated, and it is a sesquicarbonate of ammonia of variable composition that is procured. When the process is carried on in the large way, the sublimation is generally performed from an iron pot, to which the heat is directly applied, and which is connected with a large earthen or leaden receiver. The Dublin College, instead of carbonate of lime, order carbonate of soda ; with this the application of so high a heat will not be required ; but not being sufficiently economical, the direction will not be attended to by the practical chemist. The proportion of carbonate of lime ordered by the Edinburgh and London Colleges is too large, and the excess, by adding to the mass of materials, adds to the expense of the vessels and fuel. It should be rather less than the weight of muriate of ammonia employed. It would appear, that in the process given by the Dublin College, the proportion of carbonate is rather less than is requisite to afford carbonic acid to the alkali, some of which rises in the caustic state.

According to the experiments of Mr. Phillips, this salt consists of an equivalent of ammonia combined with an equivalent and a half of carbonic acid, and a considerable proportion of water, or it is a hydrated sesquicarbonate of ammonia. By keeping, it loses more ammonia, and becomes a bicarbonate. Its smell is pungent and ammoniacal, and it changes the vegetable colours to a green. It is very volatile, abundantly soluble in water, and is efflorescent on exposure to the air. Itsmedicinal uses are as a stimulant applied to the nostrils in fainting, and as a stimulant and diaphoretic taken internally, in a dose of from five to fifteen grains. It has been employed with some advantage too in scrofula, combined with bitters.

Solutio subcarbonatis ammoniæ. Solution of Subcarbonate of Ammonia. Ed.

" Take of Subcarbonate of Ammonia, one part ; Distilled Water, four parts. Dissolve the subcarbonate in the water, and strain through paper."

Liquor ammoniæ subcarbonatis. Liquor of Subcarbonate of Ammonia. Lond.

" Take of Subcarbonate of Ammonia, four ounces ; of Distilled Water, a pint. Dissolve the subcarbonate of ammonia in the water, and strain through paper."

Aqua carbonatis ammoniæ. Water of Carbonate of Ammonia. Dub.

"Take of Carbonate of Ammonia, four parts; Distilled Water, fifteen parts. Dissolve the carbonate of ammonia in the water, and filter through paper. The sp. gr. is 1090."

Water of subcarbonate of ammonia is applied to the same medicinal purposes as the concrete subcarbonate, and being more convenient, is generally prescribed for internal use. It must be prepared with cold water, as hot water decomposes the salt.

Ammoniæ bicarbonas. Bicarbonate of Ammonia. Dub.

"Take of Solution of Carbonate of Ammonia, any quantity. Expose it in a proper apparatus to a stream of carbonic acid gas, evolved during the solution of white marble in diluted muriatic acid, until the alkali be saturated. Then let it rest to form crystals, which are to be dried without heat, and preserved in a close vessel."

It happens in the case of ammonia, as with potash and soda, that when the carbonate is combined with an additional equivalent of carbonic acid, it becomes much less soluble in water; hence in the above process the bicarbonate produced crystallizes without evaporation from the fluid that had held the carbonate dissolved. The process is facilitated, and the product increased, by applying pressure to condense the acid gas into the solution. The bicarbonate forms crystals, which are larger, less pungent in taste and smell, and more permanent than the carbonate. Its medical use has been already considered, (p. 232.)

Aqua ammoniæ. Water of Ammonia. Ed.

"Take of Muriate of Ammonia, one pound; Lime, recently prepared, a pound and a half; Distilled Water, one pound; Water, nine ounces. Pour the water upon the lime bruised in an iron or earthen vessel, closing the vessel, until the lime, having fallen into powder, has become cold; then mix the muriate, beat to a very fine powder, with the slaked lime, rubbing them together in a mortar, then put them into a retort of glass. Let the retort be placed in a sand-bath, and connect with it a receiver furnished with a tube, which is to be inserted almost to the bottom of the phial containing the distilled water; the phial, however, should be capable of containing double the quantity. Then apply the fire, increasing it gradually until the bottom of the iron pot is at a red heat, and as long as the ammonia is produced. The sp. gr. of this water is 0.939. It should be preserved in vessels well closed."

Liquor ammoniæ. Liquor of Ammonia. Lond.

"Take of Muriate of Ammonia, eight ounces; newly prepared Lime, six ounces; Water, four pints. Pour a pint of the water on the lime; cover the vessel, and put it aside for an hour, then add the muriate of ammonia, and the rest of the water previously heated, and again cover the vessel; strain the liquor after it has cooled; then distil twelve fluid-ounces of liquor of ammonia into a receiver, the temperature of which is not above 50°. The sp. gr. of this liquor is 0.960."

Aqua ammoniæ causticæ. Water of Caustic Ammonia. Dub.

"Take of Muriate of Ammonia reduced to powder, three parts;

recently Calcined Lime, two parts; Water, ten parts. Sprinkle on the lime, put into an earthen vessel, one part of water, and close the vessel. Dissolve the salt in the rest of the water, heated. Pour the solution, after it has cooled, upon the slaked lime put into a retort after it has become cold, and distil with a moderate heat, into a receiver kept cold, five parts of liquor. The sp. gr. is .950."

In these processes, the lime combines with the muriatic acid of the muriate of ammonia, and the ammonia is disengaged. Being permanently elastic, it is condensed only by combination with water, and this is effected either by distilling water at the same time from the materials, or by transmitting the ammoniacal gas through water. The Edinburgh College employ the latter mode, and a solution is obtained in this way, perhaps more strongly impregnated; the other is more easily conducted, and affords a product sufficiently strong for any medicinal or pharmaceutical purpose. The process of the London Pharmacopœia has the peculiarity that the lime is not put into the retort, but is mixed with the muriate of ammonia and the water, and the liquor from this mixture is distilled. It might be doubted *a priori*, whether in this way a sufficient quantity of lime will be taken up to decompose the whole of the muriate of ammonia. From lime, however, forming a soluble ternary compound with ammonia and muriatic acid, this appears to be the case; the application of the heat subverts this combination, and expels the ammonia, which the water rising in vapour condenses. This process is perhaps preferable to any other, both as diminishing the bulk of the materials affording the product, and as it is difficult, when the lime is put into the retort, to extract the residual mass after the distillation. Mr. Phillips objected to the Edinburgh process, that the quantity of lime is too large, requiring large vessels; Dr. Hope replied, that the excess of lime renders the process more economical, the sal-ammoniac being more completely decomposed, and with the application of less heat. This was at length admitted by Mr. Phillips, who remarked, however, and with justice, that the quantity of lime ordered by the College is so great, that though it be diminished by a third, there will still be more than enough. He objected also, that the mixing the dry materials is an unpleasant operation, from the pungent vapour of ammonia exhaled; but if it be performed quickly, and the mixture immediately transferred to the retort, this causes little inconvenience. From the experiments of Dr. Barker, it appears that but a small quantity of ammonia passes over towards the end of the process, and that it is not advisable to distil off so much as the London and Dublin Colleges direct.

When this process is conducted on a large scale, an iron still is employed, into which the materials are put, and to which the fire can be directly applied; the head of the still being connected with a spiral tube placed in a refrigeratory, to the extremity of which, besides the recipient to collect the condensed product, two or three receivers are adapted, containing water to absorb any ammoniacal gas. A modification of this apparatus might be advantageously used on a small scale; or it might be economical to expose the dry mixture of the muriate and the lime to heat in an iron bottle, and con-

dense the ammoniacal gas by receiving it in water. This would obviate the chief disadvantage of the Edinburgh process, that a quantity of lime remains in the retort, which it is difficult to extract.

Water, under a common atmospheric pressure, and at a temperature below 50°, absorbs about one-third of its weight of ammoniacal gas; and by this combination its specific gravity is diminished, that of the saturated solution being not more than .875. It is seldom so completely impregnated. As prepared by the first of the above processes its density is .939, and it contains 15 *per cent.* of ammonia; by the second it is procured of density .950, containing 12 *per cent.* of ammonia; and by the third, of density .960, and containing only 10 *per cent.* of alkali. Water of ammonia has a strong and pungent smell; its taste is extremely acrid, and it inflames the skin. Though its odour is pungent, it ought to be free from any fetor. It is employed in medicine, but rarely, as a stimulant and diaphoretic, internally, in a dose from twenty to thirty drops, and sometimes as an emetic in a larger dose diluted with water, (p. 180). Externally it is used as a stimulant applied to the nostrils, and as a rubefacient, (p. 255); with the latter intention it is applied mixed with oil, or with soap liniment.

Aqua ammoniæ diluta. Dilute Water of Ammonia. Ed.

"Take of Water of Ammonia, one part; Distilled Water, two parts. Mix them."

This affords a sufficiently dilute preparation of the water of ammonia, for medical purposes, for which the strong solution is much too caustic.

Alcohol ammoniatum. Ammoniated Alcohol. Ed.

"Take of Stronger Alcohol, thirty-two ounces; recently Prepared Lime, twelve ounces; Muriate of Ammonia, eight ounces; Water, six ounces. From these, prepare the ammoniated alcohol in the same manner as the water of ammonia, and preserve it in a similar manner."

Spiritus ammoniæ. Spirit of Ammonia. Lond.

"Take of Proof-Spirit, three pints; Muriate of Ammonia, four ounces; Subcarbonate of Potash, six ounces. Mix them, and by a gentle heat distil a pint and a half over into a receiver kept cold."

Spiritus ammoniæ. Spirit of Ammonia. Dub.

"Take of Rectified Spirit, three pints; Carbonate of Ammonia, coarsely powdered, three ounces and a half. Mix and dissolve the salt with a moderate heat, then filter the solution."

In the process of the Edinburgh Pharmacopœia, the lime combining with the muriatic acid of the muriate, disengages the ammonia, which is condensed by the alcohol. In that of the London Pharmacopœia, the decomposition is produced by subcarbonate of potash; and in that of the Dublin College, carbonate of ammonia is heated with alcohol, which having a stronger affinity to the alkali than the acid, attracts part of the ammonia, disengaging the carbonic acid. The first of these processes is the only one that affords a com-

bination of alcohol and pure ammonia, in the others variable quantities of carbonate and sesquicarbonate of ammonia exist also in the spiritous solution; the product of the London process, indeed, being merely a solution of carbonate of ammonia in weak spirit, is unfit for the purpose to which the ammoniated alcohol is chiefly applied, that of dissolving camphor and essential oils. In this process a large portion of the salt sublimes and concretes unchanged on the sides of the receiver. An improved form of the process was proposed by Mr. Phillips, to distil alcohol from the common sesquicarbonate of ammonia with the addition of a little water; a portion of carbonic acid is expelled by the heat, and the ammonia retains only so much as to be still soluble in the alcohol. It may be more economical, and afford a product rather more strongly impregnated, to distil the alcohol from the sesquicarbonate of ammonia, with the addition of a little water of pure ammonia. But the process of the Edinburgh Pharmacopœia seems still to be the best. It is only to be remembered that pure ammonia being very volatile, and retained by only a weak affinity in the ammoniated alcohol, this spirit, and the tinctures made with it, cannot be preserved long, unless in bottles carefully closed.

Ammoniated Alcohol has the pungent smell, and retains all the powers of ammonia; it is used principally as the menstruum of some vegetables with which ammonia coincides in medicinal operation. Given internally, it is a powerful diffusible stimulant, which must be exhibited with much caution. Externally, it is a rubefacient; and when conjoined with camphor, is a highly stimulating liniment.

Aqua acetatis ammoniæ. Water of Acetate of Ammonia. Ed.

"Take of Subcarbonate of Ammonia, any quantity in powder. Pour upon it as much acetic acid as may be sufficient to saturate the ammonia exactly."

Liquor ammoniæ acetatis. Liquor of Acetate of Ammonia. Lond.

"Take of Carbonate of Ammonia, two ounces; Diluted Acetic Acid, four pints, or a sufficient quantity. Add the acid to the carbonate of ammonia until effervescence is no longer excited, and mix them."

Aqua acetatis ammoniæ. Water of Acetate of Ammonia. Dub.

"Take of Carbonate of Ammonia, one part; add gradually, agitating occasionally, of Distilled Vinegar, as much as may be necessary to saturate the ammonia, namely, about thirty parts; ascertaining this by the test of litmus."

The acetic acid combines with the ammonia, and disengages the carbonic acid with effervescence; the acetate of ammonia being a very soluble salt, remains dissolved in the water. As much acetic acid must be added as to produce neutralization; and as the liquid is sometimes used as an external application in cases were the acrimony of the alkali would be hurtful, it is better that there should be even a slight excess of acid. From the variable quantity of acid in the vinegar, the preparation cannot be of uniform strength; and this cannot be obviated by crystallizing the salt, the heat decomposing it which would be necessary to evaporate the water. Were it of any importance, a uniformity of strength might be obtained by ordering

the quantity prepared from a given weight of carbonate of ammonia, to be reduced by slow evaporation to a certain measure; but this is not necessary, the solution having no great activity, and being given generally in divided doses. It has long been used as a diaphoretic, and not being stimulating, is supposed to be peculiarly applicable to febrile affections, (p. 232.) Externally applied, it is said to relieve mumps.

HYDROSULPHURETUM AMMONIÆ. Hydrosulphuret of Ammonia. Ed.

"Take of Water of Ammonia, Sulphuret of Iron, of each four ounces; Muriatic Acid, eight ounces; Water, two pounds and a half. Pour the acid, previously mixed with the water, upon the sulphuret, and pass the gas that arises through the water of ammonia. The liquor should be kept in bottles well closed."

AMMONIÆ HYDROSULPHURETUM. Hydrosulphuret of Ammonia. Dub.

"Take of Sulphuret of Iron in coarse powder, five parts; Sulphuric Acid, seven parts; Water, thirty-two parts; Water of Caustic Ammonia, four parts. Put the sulphuret into a matrass, then add gradually the acid previously diluted with the water, and transmit the gas disengaged, by an apparatus properly adapted, through the water of ammonia. Towards the end of the process, apply to the matrass a moderate heat."

THE sulphuretted hydrogen is produced in this process, by the muriatic acid enabling the iron to decompose part of the water by attracting its oxygen. The hydrogen disengaged combines with a portion of the sulphur of the sulphuret of iron and forms sulphuretted hydrogen, (see the diagram, p. 432); and this gas being transmitted through the water of ammonia, unites with it, and forms a liquid of a dark green colour, and a very fetid odour. The sulphuretted hydrogen seems to act the part of an acid; and indeed it possesses so many acid qualities, that, though it contains no oxygen, it is generally regarded as an acid, and the name of Hydrothionic Acid has been given to it.

The medicinal applications of hydrosulphuret of ammonia have been already taken notice of, (p. 180).

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## CHAP. XXII.

### TERREA—EARTHS, AND EARTHY SALTS.

As chemical agents, the Earths may be characterized as dull and insipid, uninflammable, infusible, and sparingly soluble in water. Four only of them are used in medicine—Lime, Magnesia, Barytes, and Alumina; the three first of which are, from their resemblance to the alkalis, termed Alkaline Earths; the last, with others not employed in medicine, are called Proper Earths.

Combined with acids, the earths form neutral salts, resembling

strongly those salts formed by the combination of an acid with an alkali. Their effects upon the animal economy are also nearly similar.

ALUMEN EXSICCATUM. Dried Alum. Ed. Lond. Dub.

"Let Alum be liquefied in an earthen or iron vessel, and exposed to heat until it cease to boil; then reduce it to a powder."

IN this process the alum loses its water of crystallization, equal nearly to half its weight; it is deprived of its hardness, and resolved into a spongy mass, easily reducible into a fine powder; from this, and from being rendered more active, it is better adapted to the purposes of an escharotic, to which it is applied.

LIQUOR ALUMINIS COMPOSITUS. Compound Solution of Alum. Lond.

"Take of Alum, Sulphate of Zinc, each half an ounce; Boiling Water, two pints. Dissolve the alum and the sulphate of zinc in water; then strain through paper."

THIS forms an astringent solution, which has been employed to check hæmorrhage or profuse mucous discharges; and, when largely diluted, has been used as a collyrium.

MURIAS BARYTÆ. Muriate of Barytes. Ed.

"Take of Carbonate of Barytes, Muriatic Acid, each one part; Water, three parts. To the water and acid mixed together add the carbonate, bruised into small pieces. The effervescence being finished, digest for an hour, then strain, and after due evaporation put the liquor aside that crystals may form. Repeat the evaporation as long as there is any formation of crystals.

"If the carbonate of barytes cannot be procured, the muriate may be prepared from the sulphate in the following manner:—

"Take of Sulphate of Barytes, two pounds; Wood Charcoal in powder, four ounces; Muriatic Acid, as much as may be necessary. Calcine the sulphate, that it may be the more easily reduced to a fine powder, with which is to be mixed the powder of charcoal. Put this into a crucible, and having adapted a cover, urge it with a strong fire for six hours. The matter being well triturated, put it into six pounds of boiling water, in a closed glass or earthen vessel, and mix them by agitation, preventing, as much as possible, the access of the air.

"Let the vessel stand in a vapour-bath, until the part not dissolved has subsided; then pour off the liquor. Pour on the residuum four pounds of boiling water, which, after agitation and subsidence, add to the former liquor. While it is yet hot, or, if it has cooled, having again heated it, drop into it the muriatic acid as long as effervescence is excited. Then strain it, and evaporate, that it may crystallize."

BARYTÆ MURIAS. Muriate of Barytes. Dub.

"Take of Sulphate of Barytes, ten parts; Wood Charcoal reduced to very fine powder, or Lamp Black, one part. Calcine the sulphate, and throw it, while red hot, into cold water; then reduce it to the finest powder, in the manner directed for preparing chalk.

Mix the powders intimately, put them into a crucible, and heat them in a strong fire for four hours. Dissolve the mass, when cold, in a quantity of boiling distilled water, equal to ten times the weight of the sulphate of barytes, and filter the solution. Add to this, avoiding the vapours, as much muriatic acid as will saturate the barytes. Then strain the solution, and by evaporation and cooling let crystals be formed."

The first of these processes is the one most easy of execution, the muriatic acid combining readily with the barytes, and disengaging the carbonic acid; the muriate of barytes remains dissolved, and by evaporation is obtained crystallized. But the native carbonate of barytes not being an abundant mineral, is not always to be procured: the second process, therefore, is inserted, in which the sulphate, which is a more common fossil, is substituted. In this process the carbonaceous matter with which the sulphate is heated attracts the oxygen of the sulphuric acid, and, there is reason to believe, abstracts also the oxygen of the barytes. A sulphuret of barium is formed, which, when thrown into water, decomposes it; the barium attracts oxygen and becomes barytes; while the disengaged hydrogen unites with the sulphur, forming sulphuretted hydrogen, which combines with the barytes. Supposing that the decompositions were complete, they would be as represented in the following diagram:

| | | |
|---|---|---|
| 24 Carbon, 4 atoms | Carbon, 3 at. 18 | 42 Carbonic Oxide, 3 equiv. |
| | Carbon .... 6 | 14 Carbonic Oxide. |
| 40 Sulphuric Acid | Sulphur .... 16 | |
| | Oxygen, 3 at. 24 | |
| 6 Barytes | Oxygen .... 8 | |
| | Barium .... 68 | 84 Sulphuret of Barium. |

And when the sulphuret of barium is dissolved in water the following reaction takes place:

| | | |
|---|---|---|
| 9 Water | Hydrogen 1 | 17 Sulphuretted Hydrogen. |
| | Oxygen ... 8 | |
| 84 Sulphuret of Barium | Sulphur .. 16 | |
| | Barium ... 68 | 76 Braytes. |

As the acid, yielding its oxygen with greater facility, is generally more completely decomposed than the barytes, there would appear to be usually present an excess of sulphur; hence the compound produced is a sulphuretted hydro-sulphuret. When the muriatic acid is dropt into this solution, it combines with the barytes, disengaging the sulphuretted hydrogen, which escapes with effervescence, forming the unpleasant vapours that are to be avoided, and a portion of sulphur is precipitated. The solution of muriate of barytes on evaporation affords the salt crystallized. This process, though a little complicated, is perhaps preferable to any other, as it must afford the barytic salt free from metallic impregnation; for, if any metallic matter be mixed with the sulphate, being reduced by the charcoal, it will not be dissolved in any subsequent part of the process. The addition of a little oil to the charcoal renders the decomposition of the sulphate more complete.

Muriate of barytes crystallizes in quadrangular tables: its crystals are soluble in five parts of cold and three of hot water. The taste of the salt is harsh and styptic; it proves poisonous to animals, and has been employed as a remedy in scrofula, sometimes in cutaneous diseases, and in cases of worms.

SOLUTIO MURIATIS BARYTÆ. Ed. BARYTÆ MURIATIS AQUA. Dub. Solution of Muriate of Barytes.

"Take of Muriate of Barytes, one part; Distilled Water, three parts. Dissolve. (Its sp. gr. is 1230, Dub.)"

THIS saturated solution is designed to afford a preparation of uniform strength,—a circumstance of importance, as, from the activity of the medicine, its dose requires to be regulated with care. Five drops are given twice a-day, and gradually increased to twenty or more. It has been used externally as a gentle escharotic application in cutaneous diseases, and to remove specks on the cornea.

CARBONAS CALCIS PRÆPARATUS. Prepared Carbonate of Lime. Ed.

"Carbonate of Lime, after being rubbed to powder in an iron mortar, and levigated with a little water on a porphyry stone, is to be put into a large vessel. Water is to be poured upon it, and after the vessel has been frequently agitated, it is to be poured off, loaded with the fine powder. On the water remaining at rest, a subtile powder subsides, which is to be dried. The coarse powder which the water could not suspend is to be again levigated, and treated in the same manner."

CRETA PRÆPARATA. Prepared Chalk. Lond.

"Take of Chalk, a pound. Add a little water to the chalk, and rub so as to form a fine powder. Put this into a large vessel filled with water; then shake it, and after a short time pour off the water, while still turbid, into another vessel, and put it aside, that the powder may subside. Lastly, having poured off the water, dry the powder."

"Prepared Shells (TESTÆ PRÆPARATÆ) are prepared in the same manner, being previously freed from impurities by washing with boiling water."

CRETA PRÆPARATA. Prepared Chalk. Dub.

"Take of Chalk, any quantity; rub it to powder in an earthen mortar, adding a little water. Mix it with a sufficiently large quantity of water by agitation; after a short time, when the coarser particles have subsided, pour off the liquor. This may be done frequently, repeating the trituration. Lastly, collect the very fine powder, which after some time subsides from the liquor poured off, and dry it on a bibulous stone or paper."

CHALK is a native carbonate of lime, seldom perfectly pure, but containing portions of argillaceous and siliceous earths. The crab-stones are concretions found in the stomach of the river craw-fish (Cancer Astacus). They are collected when the animal is in a putrid state, are washed and dried. They have the advantage of being free from gritty particles, and form therefore a smoother powder. They consist of carbonate and phosphate of lime, with a portion of

gelatin; the proportion of carbonate being about seventy, of phosphate, ten or twelve. Shells are of similar composition; but for all these there is generally substituted in the shops chalk prepared with care, and having a little gelatin diffused through it. They are used as antacids or absorbents, also externally to absorb acrid matter from ulcerated surfaces.

CALCIS CARBONAS PRÆCIPITATUM. Precipitated Carbonate of Lime. Dub.

"Take of Water of Muriate of Lime, five parts. Add to it, of Carbonate of Soda, dissolved in four times its weight of warm distilled water, three parts. Render the precipitate pure, by allowing it to subside three times, and washing it each time with a sufficient quantity of water. Then collect it, and dry it on a chalk stone or bibulous paper."

IN this process the muriate of lime is decomposed by double affinity, the muriatic acid being attracted by the soda, and the carbonic acid combining with the lime. The crystallized carbonate of soda contains ten equivalents of water, and taking these into account, the following are the changes produced:

| | | |
|---|---|---|
| 65 Muriate of Lime | Lime . . . . . . 28 | 50 Carbonate of Lime. |
| | Muriatic Acid 37 | |
| 144 Crystal. Carbonate of Soda | Water. . . . . . 90 | |
| | Carbonic Acid 22 | |
| | Soda. . . . . . . 32 | 159 Muriate of Soda. |

The process affords carbonate of lime very pure, but is rather expensive, considering that the perfect purity of the product is not of great consequence.

POTIO CARBONATIS CALCIS. Potion of Carbonate of Lime. Ed.

"Take of Prepared Carbonate of Lime, an ounce; Refined Sugar, half an ounce; Mucilage of Gum Arabic, two ounces. Rub them together, and then add gradually, Water, two pounds and a half; Spirit of Cinnamon, two ounces."

MISTURA CRETÆ. Chalk Mixture. Lond. Dub.

"Take of Prepared Chalk, half an ounce; Refined Sugar, three drachms; Gum Arabic in powder, half an ounce, (Mucilage of Gum Arabic, an ounce, Dub.); Water, a pint. Mix them by trituration."

THE chalk is in these mixtures suspended by the mucilage; they afford a form in which it is given as an antacid, but it may be doubted whether the mucilage and sugar will not rather be injurious in that state of the stomach which generates acidity. The dose is one or two ounces.

CALX. Lime. Lond.

"Take of White Marble, a pound. Bruise into small pieces, and calcine these in a crucible with a very strong fire for an hour, or until the carbonic acid is entirely expelled, so that acetic acid, when added, shall not disengage any bubbles of air.—CALX E TESTIS. Lime from Shells. In the same manner, lime may be prepared from

shells, after these have been washed in hot water, and freed from their impurities."

There is little advantage in the introduction of this process; lime prepared on the large scale, for the numerous uses to which it is applied, being sufficiently pure for any medicinal purpose, especially as, when it is internally administered, it must be given in solution; and in the state in which it is usually met with, it impregnates water just as strongly as lime in its purest state.

Solutio calcis, *sive Aqua Calcis.* Lime Water. Ed.

"Take of Lime recently prepared, half a pound. Put it into an earthen vessel, and sprinkle upon it four ounces of water, keeping the vessel closed while the lime becomes hot, and falls into powder; then pour on it twelve pounds of water, and mix them by agitation. After the lime has subsided, repeat the agitation; and do so about ten times, keeping the vessel always shut, that the free access of the air may be prevented. Let the water be strained through paper, interposing between the filter and the funnel glass rods, that the water may pass through as quickly as possible. Let it be kept in small bottles well stopt."

Liquor calcis. Liquor of Lime. Lond.

"Take of Lime, half a pound; Distilled Water, twelve pints. Pour the water upon the lime, and shake them together, then immediately cover the vessel, and put aside for three hours; afterwards keep the liquor with the remaining lime in a glass vessel closed, and when it is to be used pour off the clear liquor."

Aqua calcis. Lime Water. Dub.

"Take of recently Calcined Lime, Warm Water, of each one part. Put the lime into an earthen vessel, and sprinkle the water upon it, closing the vessel while the lime becomes hot and falls into powder, then pour upon it thirty parts of cold water. The vessel being again closed, agitate the mixture frequently during twenty-four hours; lastly, when the lime has subsided pour off the clear liquor, and keep it in vessels well stopt."

When limestone, which is a carbonate of lime, is calcined, the carbonic acid is expelled, and caustic lime remains; water poured upon it is immediately absorbed, the lime becomes very hot, and after a little, splits and falls to powder, termed *slaked lime.* This is hydrate of lime. If it be diffused in water, a small portion of it is dissolved, forming lime water. The lime is so sparingly soluble in water, that the portion dissolved is not more than a 756th part of the weight of water present; yet notwithstanding this small quantity, the water has a strong styptic taste, and changes the vegetable colours to a green. The caution to exclude the air in this process arises from the supposition that the lime would combine rapidly with the carbonic acid of the atmosphere. After the solution is strained, it is at least necessary that it should be kept in vessels well stopt; and the direction of the London College is preferable, to keep it in contact with the lime, pouring it off when required for use. The London College formerly ordered boiling water to be poured upon the lime, but this was an improper direction, as lime has the pecu-

liarity of being more soluble in cold than in hot water. Lime water is the form under which lime is used internally, as a tonic, antacid and lithontriptic. Externally it is applied to sores and ulcers, and as an injection in fistulas and ulcers of the bladder.

AQUA CALCIS COMPOSITA. Compound Lime Water. Dub.

"Take of Guaiac Wood in shavings, half a pound; Liquorice Root cut and bruised, an ounce; Bark of Sassafras bruised, half an ounce; Coriander Seeds, three drachms; Lime Water, six pints. Macerate them without heat for two days in a closed vessel, shaking occasionally, and strain."

THE lime water can derive little additional power from these ingredients, and they, on the other hand, must have their powers very imperfectly extracted. The preparation is one, therefore, which can have little activity.

SOLUTIO MURIATIS CALCIS. Solution of Muriate of Lime. Ed.

"Take of Hard Carbonate of Lime, (namely White Marble,) in small pieces, nine ounces; Muriatic Acid, sixteen ounces; Water, eight ounces. Mix the acid with the water, and add gradually the pieces of carbonate of lime. The effervescence being finished, digest for an hour. Pour off the liquor, and reduce it by evaporation to dryness. Dissolve the residuum in its weight and a half of water, and strain through paper."

CALCIS MURIAS. Muriate of Lime. Lond.

"Take of the Salt which remains in the distillation of Subcarbonate of Ammonia, two pounds; Water, a pint. Mix, and strain through paper; evaporate the liquor until the dry salt is obtained. Let this be kept in a vessel accurately stopt."

LIQUOR CALCIS MURIATIS. Solution of Muriate of Lime. Lond.

"Take of Muriate of Lime, two ounces; Distilled Water, three fluid-ounces. Dissolve the muriate of lime in the water, then strain through paper."

CALCIS MURIAS. Muriate of Lime. Dub.

"Take of the Liquor which remains after the distillation of Water of Caustic Ammonia, any quantity. Strain it, and expose it to heat in an open vessel until the muriate of lime become perfectly dry. Keep this in a well-closed vessel."

CALCIS MURIATIS AQUA. Water of Muriate of Lime. Dub.

"Take of Muriate of Lime, two parts; Distilled Water, seven parts. Dissolve. The sp. gr. of the solution is 1202."

IN the process of the Edinburgh Pharmacopœia, the muriatic acid combines with the lime and disengages the carbonic acid; to remove any superfluous acid, and obtain a solution of uniform strength, the solid salt is obtained by evaporation, and redissolved in a fixed proportion of water. In the process of the London College, of preparing subcarbonate of ammonia by decomposing muriate of ammonia, the residual salt is muriate of lime, which by solution and filtration is obtained pure. The Dublin College in like manner procure it from the residuum in the preparation of water of ammonia. When muriate of lime is brought to a state of dryness it is decomposed, the hydrogen of the acid and oxygen of the lime form water, which

is carried off in the evaporation, and chloride of calcium remains. These changes are represented in the following diagram :

| | | | |
|---|---|---|---|
| 37 Muriatic Acid | Hydrogen 1 | | 9 Water. |
| | Chlorine 36 | | |
| 28 Lime . . . . . . | Oxygen 8 | | |
| | Calcium 20 | | 56 Chloride of Calcium. |

In this dry state, chloride of calcium is used by the Dublin College for the concentration of alcohol, (p. 393,) but for medicinal use it must be dissolved, when the reverse changes happen, and the chloride of calcium becomes again muriate of lime. The solution of muriate of lime, as ordered by the Colleges, is of different degrees of strength, one part of the salt, by the London formula, is dissolved in $1\frac{1}{4}$ of water, by the Edinburgh, in 2 parts of water, and by the Dublin formula, in $3\frac{1}{2}$ parts of water. Muriate of lime can be obtained in crystals, which contain six equivalents of water ; it attracts moisture rapidly from the atmosphere, and is so soluble in water, that that fluid will dissolve it till it become viscid. The solution of muriate of lime is a valuable tonic in scrofula, (p. 128,) and glandular diseases.*

Calcis phosphas præcipitatum. Precipitated Phosphate of Lime. Dub.

"Take of Burnt Bones, reduced to powder, one part ; dilute Muriatic Acid, Water, of each two parts. Digest them together during twelve hours, and filter the liquor : add to this of water of caustic ammonia as much as may be sufficient to throw down the phosphate of lime. Wash this with a sufficiently large quantity of water, and dry it."

It has been already mentioned, that the earthy matter of bones is phosphate of lime, which remains after the animal matter is burnt out. This compound is soluble in muriatic acid, and when, as directed in the process, ammonia is added to the solution, this neutralizes the muriatic acid, and the phosphate of lime, which of itself is insoluble, is precipitated ; the nature of the reaction is exhibited in the following diagram :

| | |
|---|---|
| Ammonia . . . . . . 17 | 54 Muriate of Ammonia. |
| Muriatic Acid . . 37 ? | |
| Phosphoric Acid . 28 | |
| Lime . . . . . . . . . 28 | 56 ? Phosphate of Lime. |

By washing with water the muriate of ammonia is removed, and the phosphate of lime obtained in the state of fine powder. It is white and tasteless. It is given in rickets, a disease which seems to be owing to deficiency of phosphate of lime in the bones, in doses

* From Dr. Murray's views of the nature of mineral waters, it would appear that muriate of lime is one of the chief active ingredients in saline waters, and more especially in those which have been found beneficial in scrofula. He was of opinion, that the state of great dilution in which the salt exists favours its action, by enabling it to enter the circulation.—*Ed.*

of from three grains to half a drachm, and combined with tonics, especially carbonate of iron, is said to be beneficial.

CARBONAS MAGNESIÆ. Carbonate of Magnesia. Ed.

"Take of Sulphate of Magnesia, four parts; Subcarbonate of Potash, three parts; Boiling Water, as much as may be necesssary. Let the salts be dissolved separately in twice their weight of warm water, and either strained or otherwise freed from impurities. Then mix them, and immediately add eight times their weight of boiling water. Boil the liquor for a short time, stirring it; then allow it to remain at rest, until the heat be diminished a little, and strain it through linen, on which the carbonate of magnesia will remain. Wash it well with pure water, and dry it afterwards by a gentle heat."

MAGNESIÆ SUBCARBONAS. Subcarbonate of Magnesia. Lond.

"Take of Sulphate of Magnesia, a pound; Subcarbonate of Potash, nine ounces; of Water, three gallons. Dissolve separately the subcarbonate of potash in three pints of water, and the sulphate of magnesia in five pints, and strain; then add the remaining water to the liquor of the sulphate of magnesia, and boil; add the former liquor to it whilst it boils, constantly stirring with a spatula: afterwards strain through linen: lastly, wash the powder, by frequently pouring on it boiling water, and dry it on bibulous paper, by a heat of 200°."

CARBONAS MAGNESIÆ. Carbonate of Magnesia. Dub.

"Take of Sulphate of Magnesia, twenty-five parts; Carbonate of Potash, twenty-four parts; Boiling Water, four hundred parts. Dissolve the sulphate of magnesia and the subcarbonate of potash, each in two hundred parts of water. Mix the clear liquors, boil the mixture a little, and strain it while warm through linen stretched, so as to collect the magnesia. Wash out the sulphate of potash, by frequently pouring on boiling water; lastly, dry the carbonate of magnesia."

IN this process there is a mutual decomposition of the salts, the sulphuric acid of the sulphate of magnesia combining with the potash of the carbonate of potash, and the carbonic acid uniting with the magnesia. In the proportion of equal parts of the sulphate and subcarbonate, more of the latter is employed than is necessary; three parts of it, according to Mr. Phillips, decompose four parts of the sulphate of magnesia, and this proportion is now adopted by the London College. The use of adding the boiling water, and boiling the liquor, is partly to dissolve the sulphate of potash, which is a salt sparingly soluble, and partly to prevent a species of crystallization which the carbonate of magnesia would undergo, rendering it gritty, and thus give it a smoothness which it has not when this precaution is not observed. It is useful also in expelling any excess of carbonic acid which may exist in the subcarbonate of potash. Carbonate of magnesia, however, is generally prepared on a large scale from the Bittern, or liquor remaining after the crystallization of muriate of soda from sea water, which is principally a solution of mu-

riate of magnesia. This is decomposed by carbonate of potash, or sometimes by an ammoniacal carbonate; and there are some niceties of manipulation requisite to give it the whiteness, lightness, and smoothness, which are valued as marks of its goodness. A certain temperature is required for the preparation; the precipitate is allowed to subside gently, and the clear liquor above is drawn off; warm water is first added; when the saline matter is nearly washed out, cold water is poured on. From the due management of these and other circumstances, the product is superior in these qualities to what it is when prepared by the above process on a small scale.

This substance, properly prepared, is nearly insipid, light, white, and smooth to the touch; is insoluble in water. Its composition varies both in the proportion of acid and of water; as commonly prepared, the proportion of acid is less than an equivalent, hence it is named subcarbonate by the London College. It is given as an antacid in a dose from a scruple to a drachm, and usually produces at the same time a laxative effect. It is also given as a palliative in calculous disorders, where there is a disposition to form uric acid.

MAGNESIA. Magnesia. Ed. Dub.

"Let Carbonate of Magnesia be exposed in a crucible to a red heat for two hours. Then preserve it in glass phials well stopt."

MAGNESIA. Magnesia. Lond.

"Take of Subcarbonate of Magnesia, four ounces. Calcine it with a very violent heat for two hours, or until diluted acetic acid dropt upon it does not excite effervescence."

By the heat applied, the carbonic acid of the carbonate, and a considerable portion of its water, are expelled, and the pure magnesia remains. Small particles of the earth are raised by the gas, giving the appearance of a vapour escaping. It loses rather more than half its weight. A smaller quantity, therefore, of the pure magnesia, will produce the same effect as a larger of the carbonate. It is preferred to the latter, both from this circumstance, and also where, from the abundant acidity on the stomach, flatulence is occasioned by the disengagement of carbonic acid when the carbonate is used. The subcarbonate employed in its preparation requires to have been very carefully washed; for if even a minute quantity of sulphate of potash adheres to it, which is liable to be the case where the washing has not been thoroughly performed, this seems to be decomposed by the heat applied for the calcination, and a disagreeable sulphureous taste is communicated to the calcined magnesia. If properly prepared, magnesia will not exhibit effervescence when touched with an acid. Henry's magnesia, which is held in greatest estimation in this country, is supposed to be prepared by precipitation from a solution of the sulphate by caustic potash; it is much denser and heavier than the magnesia prepared by the above method. It appears from the experiments of Dr. Fyfe, that magnesia, like lime, is less soluble in boiling than in cold water.

MAGNESIÆ SULPHAS PURUM. Pure Sulphate of Magnesia. Dub.

"Take of Commercial Sulphuric Acid, twenty-five parts; Water,

one hundred parts; Carbonate of Magnesia, twenty-four parts, or as much as may be required to saturate the acid. Mix the sulphuric acid and water, and then gradually add the carbonate of magnesia. Lastly, evaporate the filtered liquor, so that crystals may form on cooling."

This process will certainly never be put in practice while sulphate of magnesia can be procured, on the great scale, from sea water, at a much less expense.

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# CHAP. XXIII.

## METALLICA—METALLIC PREPARATIONS.

The metallic preparations form some of our most important remedies. They are those most liable to uncertainty in their operation, from variations in the process to which they are subjected; they are at the same time those which, from their activity, it is necessary to have least variable in strength. The principles, therefore, which regulate their combinations, so far as these are connected with their pharmaceutic preparation, are highly important, and require some illustration before proceeding to the individual preparations.

The general characters of the metals have been already considered, (p. 17.) The metals used in medicines are, Silver, Quicksilver, Copper, Iron, Lead, Tin, Zinc, Bismuth, Antimony, and Arsenic.

Metals in their pure state, being insoluble in the animal fluids, can scarcely exert any action on the system. Tin, by a mechanical action, is supposed to have an anthelmintic power: some of the others, as iron, copper, and lead, have been supposed to be capable of being acted on by the gastric fluids, so as to produce certain effects; but in general they must be combined with other agents to render their action powerful and certain; and it is their preparations only that are used in medicine.

The simplest form of combination in which metals are administered is in the state of Oxide. Their oxidation is generally effected by the action of atmospheric air, assisted by heat, sometimes by deflagration with nitre, and sometimes also by acids, the acid being afterwards abstracted by the action of a substance exerting an affinity to it. The first mode always gives the oxide in its purest form; in the second mode, a portion of the alkali of the nitre often combines with the oxide; in the third, a portion of acid often adheres to it.

The principal objection to the use of metals in the state of oxides is the uncertainty of these being always of the same composition. Almost every metal is capable of combining with oxygen in several proportions; and its power of acting on the living system, in common with all its qualities, is much influenced by the quantity with which it is combined. And farther, the different oxides which a metal forms are frequently intermixed, in various proportions, with each

other; the proportions of each varying, with slight diversities of circumstances in the operation by which they are formed, so as to produce apparently an indefinite number of oxides. Hence the uncertainty to which such preparations are liable. And the consideration of this ought to establish a rule in Pharmacy, which has been too much neglected, that when a process for the preparation of any metallic oxide has been established, and practitioners have become accustomed to its powers and strength, it ought not to be varied or changed, from the idea of some trivial improvement; as an alteration of circumstances, apparently of little importance, may give rise to an important change in the result.

The other form of preparation under which metals are principally administered, is that in which the metallic oxide is combined with an acid. Compounds of this kind are generally more active than those in which the metal is merely oxidated. The acid perhaps imparts additional activity, and the compound being generally soluble, must act more powerfully on the stomach, and be more readily received into the circulating mass, than the oxides, which are usually insoluble.

These combinations are generally formed by subjecting the metal to the action of the acid. The acid first yields to it oxygen, either directly, by parting with a portion of what it contains, or by a resulting affinity, enabling it to attract oxygen from the water which may be present, or from the atmospheric air. With the oxide formed in either of these modes, the acid combines.

As a metal can exist in different degrees of oxidation, so it may enter into combination with acids with different proportions of oxygen, and, from this circumstance, important differences in their medicinal powers are in such cases established.

In general, when a metal is acted on by a weak acid, or one much diluted, a salt, containing the protoxide of that metal, is formed. If the acid be used in a concentrated state, and heat be employed to increase the energy of action, the metal often passes to the state of peroxide. Or if the compound of the acid and the protoxide be exposed for some time to the air, the metal gradually attracts oxygen, and a salt of the peroxide results. Now, the salts of the protoxide of a metal, in general, differ greatly in medicinal power from those of the peroxide; and as the two may exist in various degrees of intermixture, according to the circumstances under which they are formed and preserved, a want of uniformity in the medicinal activity of such preparations is a too frequent consequence.

Another source of uncertainty in the composition of the metallic salts, is, that the metallic oxide can combine with several proportions of acid. We can have the compound with the acid and metallic oxide combined in those proportions which give rise to neutralization, but we can have it also with excess of acid, or excess of base; and each of these will give a preparation different in power, and liable to be very differently affected by other chemical agents.

This is often displayed in preparing metallic compounds by the medium of acids. From the uncertainty to which the oxidation of metals, by the application of heat, is liable, it has frequently been proposed to obtain the product in the humid way, the metal being

dissolved in an acid, and this acid when abstracted by a substance exerting an affinity to it, the metal will be precipitated in its oxidated state. But these precipitates are not in general pure oxides, as they have been supposed to be: they retain a portion of the acid with which the oxide is combined, and are therefore sub-salts. They are sometimes thrown down merely by water, and they then retain a considerable proportion of acid; and even when subjected to the more powerful action of an alkali, the whole of the acid is not abstracted, the influence of quantity adding so much to the force of affinity, that a portion of it is retained by the oxide.

From these observations, the necessity is apparent, of defining exactly the processes for the preparation of metallic remedies, and of using every precaution to exclude causes which might produce variation in the products.

The nomenclature of the metallic oxides has been already explained, (p. 18,) and of the metallic salts, (p. 24.)

Compounds of metals with chlorine and with sulphur are also used in medicine. Of the former, the greater number exist as chlorides only when in the dry state, being converted into salts of muriatic acid when dissolved in water; and in that condition in which they are employed, the remarks which have been given respecting metallic salts apply to them; such of the sulphurets too as are active are those which are soluble, and become hydrosulphurets of oxides. The insoluble chlorides and sulphurets are, with the exception of calomel, of little activity.

## ANTIMONIUM—ANTIMONY.

SULPHURETUM ANTIMONII PRÆPARATUM. Prepared Sulphuret of Antimony. Ed.

"Put Sulphuret of Antimony, rubbed to powder in an iron mortar, and afterwards levigated upon a porphyry stone, in a large vessel; then pour upon it water, which, after shaking the vessel frequently, is to be poured off, loaded with fine powder. After the water has settled, the powder will subside, and then may be dried. The coarse powder which the water cannot suspend is to be again levigated, and treated in the same manner."

ANTIMONII SULPHURETUM PRÆPARATUM. Prepared Sulphuret of Antimony. Dub.

"Take of Sulphuret of Antimony, any quantity. Reduce to powder, and in the manner prescribed for the preparation of chalk, separate the finest particles, which are to be reserved for use."

THIS preparation is merely levigation; in this levigated state, the sulphuret of antimony has been supposed to act with more certainty than when in coarse powder. It is, however, a very inactive remedy. In chronic rheumatism, it has been given in a dose of five or ten grains daily. It has been used also in cutaneous diseases, in scrofula, and glandular obstructions. It has been applied externally to cancerous sores.

OXIDUM ANTIMONII CUM PHOSPHATE CALCIS, *olim Pulvis Antimonialis.*

Oxide of Antimony with Phosphate of Lime, or Antimonial Powder. Ed.

"Take of Sulphuret of Antimony, rubbed to a coarse powder, Hartshorn Shavings, equal parts. Mix and throw them into an iron pot, not very deep, red hot, and stir them constantly until they are burnt into a matter of a grey colour, which remove from the fire, rub to powder, and put into a coated crucible. Lute to this crucible another inverted, in the bottom of which a small hole is drilled; apply the fire which is to be gradually raised to a white heat, and kept at this increased heat for two hours. Lastly, triturate the matter, when cold, into a very fine powder."

PULVIS ANTIMONIALIS. Antimonial Powder. Lond.

"Take of Sulphuret of Antimony in powder, a pound; Shavings of Horn, two pounds. Mix, and throw them into a broad crucible, at a white heat, stirring constantly, until the vapours cease to exhale. What remains rub to powder, and put it into a proper crucible. Then apply heat, and increase it gradually to a white heat for two hours. Rub the residuum, so that it shall form a very fine powder."

PULVIS ANTIMONIALIS. Antimonial Powder. Dub.

"Take of Sulphuret of Antimony, one part; Shavings of Hartshorn, two parts. Mix them, and throw the mixture into an open iron pot heated to redness, stirring constantly until the vapours of sulphur cease to exhale, and the matter becomes of a grey colour. Rub the matter when cold into powder, and put it into a crucible. Adapt to this another inverted, in the bottom of which is a small hole. Calcine the matter with a heat gradually raised to a white heat, for two hours; when cold, rub it into a very fine powder."

THIS process has been introduced into the Pharmacopœias, as affording a preparation similar to the empirical medicine, *James's Powder*, justly celebrated as a remedy in fever. Nothing more was known of this, than that it was an antimonial, until its analysis was undertaken by Dr. Pearson. He found the genuine powder of James to consist of 43 parts of phosphate of lime, and 57 of an oxide of antimony, part of which was vitrified; and, by the above process, he was able to prepare a powder similar to it in qualities and chemical composition. The theory of the process is sufficiently obvious. During the first stage, the animal matter of the bones is decomposed and burnt out; the sulphur of the sulphuret of antimony is expelled, and the metal is imperfectly oxidated. In the second stage of the process the metal is more completely oxidated, the oxide is partially vitrified, and is perhaps brought into combination with the phosphate of lime, which is the residuum of the bones. This latter supposition remains, however, uncertain. That portion at least of the oxide which is vitrified cannot be combined with the phosphate; the other may be in this state of combination, as Dr. Pearson supposed. Chenevix, from his experiments on the powder, supposed them rather to be merely intimately mixed. He found too, that in the preparation obtained by Pearson's process, more of the oxide of antimony is vitrified than in the genuine James's powder, the proportion in the one being 44 in 100 of the oxide, in the other only 28.

The Pharmacopœias differ in the proportion of horn shavings to be used; the Colleges of London and Dublin employing twice the quantity that is ordered by the Edinburgh College. This change renders the preparation less similar to the original James's powder, but is said to prevent the vitrification of so much of the oxide, and also to afford a whiter product, that prepared with the larger proportion of sulphuret of antimony having always a yellow shade.

Mr. Chenevix proposed a method of obtaining this preparation in the humid way, by dissolving equal weights of submuriate of antimony and pure phosphate of lime in muriatic acid, and then precipitating them by pouring the solution into water of ammonia. This preparation appeared, from some trials, to be more active in its operation than the other. Mr. Brande states, that it is liable to become gritty, and difficult to reduce to powder.

James's powder has been celebrated as a remedy in febrile affections, (p. 177, 233). It acts as a general evacuant, occasioning sweat, purging, and frequently vomiting; and, by this general action, appears sometimes to arrest the progress of fever, if given at its commencement, or to produce a more favourable crisis. The preparation obtained by the process of the Pharmacopœias is said not to be so certain or so powerful as the powder of James. But both the one and the other are very uncertain in their operation, sometimes even in large doses producing no effect, at other times acting with too much power. Such differences used to be ascribed to idiosyncracy, but they seem rather to arise from variation in the composition of the powder. The efficacy of the remedy, Mr. Brande is of opinion, depends not on the large quantity of peroxide of antimony it contains, for this is an inert substance, but on the proportion of protoxide of antimony in it. And sometimes he has found five *per cent.* of the protoxide, sometimes again scarcely any. Mr. Phillips has shewn that the quantity of peroxide likewise varies. This uncertainty of composition is the chief objection to what is otherwise a valuable remedy.

Sulphuretum antimonii præcipitatum. Precipitated Sulphuret of Antimony. Ed.

"Take of Water of Potash, four pounds; Water, three pounds; Prepared Sulphuret of Antimony, two pounds; Diluted Sulphuric Acid, as much as may be necessary. Mix the Sulphuret with the Water of Potash and Water, then boil in a covered iron pot, on a gentle fire, for three hours, stirring frequently with an iron spatula, and adding water as it may be necessary. Strain the hot liquor through a double linen cloth, and to this strained liquor, add as much diluted sulphuric acid as may be necessary to precipitate the sulphuret, which is to be carefully washed with warm water."

Antimonii sulphuretum præcipitatum. Precipitated Sulphuret of Antimony. Lond.

"Take of Sulphuret of Antimony in powder, two pounds; Liquor of Potash, four pints; Distilled Water, three pints; Dilute Sulphuric Acid, as much as may be necessary. Mix the Sulphuret of Antimony, Liquor of Potash, and water, and boil with a gentle heat for three

hours, stirring constantly, and adding occasionally distilled water, so that it may keep up the same measure. Strain the liquor immediately through a double linen cloth; gradually drop into it, while still warm, the diluted sulphuric acid, as much as is sufficient to precipitate the powder, then remove the sulphate of potash, by washing with warm water: dry the precipitated sulphuret of antimony, and rub it to fine powder."

SULPHUR ANTIMONIATUM FUSCUM. Brown Antimoniated Sulphur. Dub.

"Take of Prepared Sulphuret of Antimony, one part; Water of Caustic Potash, eighteen parts; Dilute Sulphuric Acid, eleven parts, or as much as may be necessary. Add the Sulphuret of Antimony to the Water of Caustic Potash, and boil for an hour. Strain the hot liquor through a double linen cloth, and drop into it the diluted sulphuric acid. Wash away the sulphate of potash with warm water. Dry the brown antimonial sulphur, and rub it into fine powder."

IN the first part of this process sulphuret of antimony is boiled with a solution of potash, the sulphur takes hydrogen from the water present, and the antimony oxygen; sulphuretted hydrogen and protoxide of antimony result, which form with the potash a double hydrosulphuret of antimony and potash. When the sulphuric acid is added, it breaks the combination by uniting with the potash, and an orange precipitate falls down, named by the Colleges Precipitated Sulphuret of Antimony. Much pains have been bestowed on the examination of this compound, but its nature is not yet ascertained with certainty. It used to be regarded as a hydrosulphuret of protoxide of antimony. It is now believed that the oxygen of the oxide, and the hydrogen of the sulphuretted hydrogen, quit the elements with which they were united, and exist in the precipitate in the state of combined water, or the compound is one of sulphuret of antimony and water.

If, instead of adding sulphuric acid to the hot solution, the latter be allowed to stand, as it cools a red precipitate falls from it, which has been long known under the name of Kermes Mineral, and is a favourite remedy on the continent. According to Gay-Lussac it consists of two equivalents of sulphuret of antimony, combined with one equivalent of protoxide of antimony, and a portion of water.

Lastly, if after the kermes has subsided, and been withdrawn by filtering, an acid be added to the solution, a precipitate of a yellow colour is thrown down, which has been named Golden Sulphuret of Antimony. It is said to be a bisulphuret of antimony, combined with water.

Three preparations of different composition are thus obtained from the original solution of hydrosulphuret of antimony and potash. The first, procured by the immediate addition of an acid, is the hydrosulphuret of protoxide of antimony, or at least has the elements in those proportions. The second, which subsides without the addition of acid, contains besides protoxide of antimony; and, after its subsidence, the addition of acid throws down the third, which, owing to the metallic oxide being in part withdrawn, contains an excess of sulphur.

With regard to the process, it may be remarked, that the quantity of the products may be materially increased, by using more potash, and by adding a portion of sulphur, the proportion of sulphur in the native sulphuret not being sufficient to render the whole of the metal soluble, and a quantity of it, therefore, without this addition remaining undissolved.

These preparations are little esteemed in this country; they act like other antimonials, but are neither energetic nor certain. As the kermes mineral is much used abroad, the following process by M. Cluzel may be given as the best method of preparing it: Dissolve 90 parts of crystallized carbonate of soda in 1000 of water, and add 4 parts of the "prepared sulphuret of antimony;" the mixture is to be boiled for half an hour, then filtered when hot into a warm vessel; after standing twenty-four hours, the deposite is to be collected on a filter, washed with cold water, and dried on bibulous paper; it is the Kermes Mineral. It may be given in doses of five or six grains.

TARTRAS ANTIMONII, *olim Tartarus Emeticus.* Tartrate of Antimony, formerly Tartar Emetic. Ed.

"Take of Sulphuret of Antimony, Nitrate of Potash, of each equal weights; Supertartrate of Potash, as much as may be necessary. The Sulphuret and Nitrate being separately triturated, are to be well mixed, and then thrown into a red hot crucible. When the deflagration has finished, separate the red matter from the white crust, and rub it down to a very fine powder, which is to be washed several times with warm water, and then dried.

"Equal weights of this powder and the supertartrate of potash are to be triturated together, and the mixture boiled for an hour in a glass vessel, with four times its weight of distilled water; then strain it through paper, and set aside the strained solution so as to form crystals."

ANTIMONIUM TARTARIZATUM. Tartarized Antimony. Lond.

"Take of Glass of Antimony reduced to a very fine powder, and Supertartrate of Potash, in powder, of each one pound; Boiling Distilled Water, a gallon. Mix the glass of antimony thoroughly with the supertartrate of potash, and throw them gradually into the boiling distilled water, constantly stirring with a spatula; boil for a quarter of an hour and put aside. Strain the liquor when cold, and boil down the strained liquor that crystals may form."

ANTIMONII ET POTASSÆ TARTRAS, *sive Tartarum Emeticum.* Tartrate of Antimony and Potash, or Emetic Tartar. Dub.

"Take of Nitromuriatic Oxide of Antimony four parts; Bitartrate of Potash, in very fine powder, five parts; Distilled Water, thirty-four parts. Boil the water in a glass vessel, then throw into it gradually the oxide and tartar previously mixed together, and boil for half an hour; strain the liquor through paper, and let it cool slowly that crystals may form."

THE excess of tartaric acid in the bitartrate of potash is capable of combining with a number of metallic oxides, and of forming ternary compounds. With the protoxide of antimony it unites with facility,

forming a combination of this kind, which constitutes the present preparation. In all the processes, the tartaric acid of the bitartrate dissolves a portion of the oxide of antimony, and a triple compound of oxide, acid and potash crystallizes ; it is not therefore a tartrate of antimony, but a tartrate of antimony and potash, and the name given to it in two of the Pharmacopœias is chemically incorrect, and is so without any necessity. Tartras Antimonii et Potassæ is its proper appellation.

This being the most important of all the antimonials, the mode of preparing it has much engaged the attention of chemists. The principal object of their researches has been to obtain an oxide, not too expensive in its preparation, which shall combine easily with the tartaric acid. In the Edinburgh Pharmacopœia, it is the object of the first part of this process to form an impure oxide, known by the name of Crocus of Antimony. It is prepared by deflagrating sulphuret of antimony with nitre. In the deflagration, the nitric acid of the nitrate of potash is decomposed, and its oxygen is attracted, partly by the sulphur and partly by the antimony. The sulphurous acid, which is the principal product of the oxygenation of the sulphur, is in part dissipated, and in part combined with the potash ; and with a little sulphuric acid likewise produced, forms the white crust which is directed to be removed. By the union of another portion of the oxygen with the antimony, a quantity of protoxide of the metal is formed, and part of the sulphuret of antimony escaping decomposition or oxygenation, remains combined with the oxide. The preparation, therefore, consists of protoxide of antimony with sulphuret of antimony, in the proportions, according to Proust, of three parts of the former and one of the latter. It is of a reddish-brown colour : what is to be found in the shops is of a grey colour, and is usually prepared, very improperly, with a diminished proportion of nitre.

This preparation, however, is liable to several objections. The crocus of antimony of the shops, which, in general, will be used by the apothecary, is usually prepared by the trading chemist ; and the fraud has become common of preparing it without the due proportion of nitre, so that it is not properly oxidated, and is hence not easily soluble in the tartaric acid. Even when it is properly prepared, its state of aggregation, as Mr. Phillips has remarked, prevents it from being dissolved so as to saturate the tartaric acid, unless it be reduced to a very fine powder by levigation, which renders the process expensive.

The submuriate of antimony is free from these objections ; and the process introduced by the Dublin College is designed to afford it by a method of easy execution. It is said to succeed sufficiently, and the chief objection to it is the expense incurred in the previous process of the preparation of the oxide, from the large quantity of muriatic acid employed. One advantage of using it, mentioned by Mr. Phillips, is, that the muriatic acid combines with a portion of lime, which is often present in the cream of tartar, and prevents an intermixture of tartrate of lime with the tartar emetic.

The London College employ the Glass of Antimony, which has been already (p. 177) described. The principal objection to it is,

that it contains a portion of siliceous earth, which enters with the oxide of antimony into combination with the tartaric acid, and, when the liquor is evaporated, gives to it a gelatinous consistence, and prevents the crystallization. This, however, scarcely forms a just objection; for it is proper, in the crystallization of this salt, not to carry the evaporation of its solution too far. The glass of antimony is therefore, on the whole, as proper an oxide as could be employed. It sometimes, according to Mr. Phillips, contains carbonate of lime, to remove which, he recommends that it should be first boiled with dilute sulphuric acid.

Mr. Phillips has proposed a process, different from any of these, for preparing tartar emetic. It is, to boil 100 parts of metallic antimony to dryness, with 200 of sulphuric acid; then to mix the resulting subsulphate with an equal weight of bitartrate of potash, and boil them in an iron vessel, when, at the first crystallization, 9 parts in 10 of the emetic tartar will be procured. This process, he says, is easy and expeditious, and the product is not of uncertain composition.

When, by boiling the materials together, the tartrate of antimony and potash has been formed, the evaporation should be continued till a pellicle forms on the surface; the solution is then to be set aside, and the salt will separate by crystallization. In the Dublin process a much larger proportion of water is ordered than in the others; and as the evaporation is not carried far, a considerable quantity of tartar emetic must be lost in the residual liquor.

Tartrate of antimony and potash crystals in tetrahedrons, or in small octohedrons, which are slightly efflorescent. It has a styptic metallic taste, and is soluble, according to Dr. Duncan, in three parts of boiling, or fifteen parts of cold water. Its degree of solubility affords a method of judging whether it is well prepared. It consists, according to Dr. Thompson and Mr. Phillips, of two equivalents of tartaric acid, 132, three of protoxide of antimony, 156, one of potash, 48, and three of water, 27=363. Dr. Barker suspects, that, as commonly prepared, it often contains an intermixture of bitartrate of potash.

It is very susceptible of decomposition, suffering it not only from alkalis, earths, acids, and a number of neutral salts, but even from vegetable infusions and decoctions, the vegetable matter attracting apparently part of the oxygen of the oxide,—decompositions, the occurrence of which requires to be guarded against in extemporaneous prescription. If kept dissolved in water, it is decomposed, from the spontaneous decomposition of the tartaric acid.

This preparation is superior to the other antimonials in the certainty of its operation, and from its solubility is more manageable with regard to dose. Its medicinal applications have been already considered, (p. 178, 233, 254.)

Vinum tartratis antimonii. Wine of Tartrate of Antimony. Ed.

"Take of Tartrate of Antimony, twenty-four grains; White Spanish Wine, one pound. Mix, so that the tartrate of antimony may be dissolved."

Antimonial Wine was formerly prepared by macerating white

wine on the Vitrified Oxide of Antimony in powder, the tartaric acid of the wine dissolving a portion of the oxide, so that the wine acquired the powers of an antimonial preparation. It was liable to be variable in strength, from the proportion of acid in the wine not being uniform.

The present preparation was therefore substituted for it. It may be doubted, however, whether it is properly officinal. The salt, dissolved in wine, can indeed be preserved longer without decomposition than when dissolved in water; but still, on long keeping, part of the antimonial oxide is deposited. It is given as an emetic in the dose of one ounce: as a diaphoretic, in a dose of one or two drachms. When newly prepared, it contains two grains of emetic tartar in a fluid-ounce.

VINUM ANTIMONII TARTARIZATI. Wine of Tartarized Antimony. Lond. LIQUOR TARTARI EMETICI. Liquor of Emetic Tartar. Dub.

"Take of Tartarized Antimony, a scruple; Boiling Distilled Water, eight fluid-ounces; Rectified Spirit, two fluid-ounces. Dissolve the tartarized antimony in the boiling distilled water: then to the strained liquor add the spirit."

THE name of Vinum, given to this preparation by the London College, though incorrect, is intended to shew that it is a substitute for the antimonial wine that was before in the Pharmacopœia. It is of the same strength as the former, and in this respect agrees with the analogous preparation in the Edinburgh Pharmacopœia. It is less liable to spontaneous decomposition: the counteracting this indeed is the only use of the alcohol, for tartarized antimony is insoluble in alcohol alone.

OXYDUM ANTIMONII NITROMURIATICUM. Nitromuriatic Oxide of Antimony. Dub.

"Take of Prepared Sulphuret of Antimony, twenty parts; Muriatic Acid, one hundred parts; Nitrous Acid, by measure, one part. Add the sulphuret gradually to the acids, priviously mixed in a glass vessel, avoiding the vapours; then digest with a heat gradually raised until the mixture cease to effervesce; lastly, boil for an hour. Strain the liquor when cold, and receive it in a gallon of water; wash the oxide of antimony which is precipitated with a sufficient quantity of water, until the decanted liquor appear, by the test of litmus, to be free from acid; lastly, dry the oxide on bibulous paper."

IT has been an object of considerable importance in Pharmacy, to procure a pure oxide of antimony in a loose state of aggregation, which might be employed in the preparation of some of the other antimonials, particularly of the tartrate of antimony and potash. With this view, this process was introduced into the Dublin Pharmacopœia. The first step is to form protomuriate of antimony, which is done by heating sulphuret of antimony in muriatic acid, to which a small portion of nitric acid is added. The antimony, aided by the resulting affinity of the muriatic acid, attracts oxygen from the water present, and becomes protoxide of antimony, with which the muriatic acid combines; the sulphur of the sulphuret, and the hydrogen of the water, at the same time unite and escape in the form of sulphu-

retted hydrogen. The following diagram exhibits the nature of this reaction:

| | | | |
|---|---|---|---|
| 9 Water . . . . | Hydrogen 1 | | 17 Sulphuretted Hydrogen. |
| | Oxygen . 8 | | |
| 60 Sulphuret of Antimony | Sulphur . 16 | | |
| | Antimony 44 | | |
| 37 Muriatic Acid . . . . . . | 37 | | 89 Muriate of Antimony. |

The solution of muriate of antimony is poured into a large quantity of water, which exerting a stronger affinity to the acid than the oxide of antimony does, abstracts the greater part of it, and the oxide of antimony is precipitated. It is not, however, a pure oxide that is obtained, but rather a submuriate, a portion of the acid still adhering to it. According to Mr. Phillips, it consists of one equivalent of acid and nine of protoxide of antimony. The acid may be completely abstracted by submitting the precipitate to the action of subcarbonate of potash dissolved in water. But this is scarcely necessary; and there is even reason to believe, that for the purpose to which this oxide is designed to be applied, that of preparing tartar emetic, the presence of a little muriatic acid, instead of being detrimental, is useful (p. 435.)

The use of the small quantity of nitric acid ordered in the formula, is to decompose any portion of sulphuretted hydrogen which might be retained in solution in the muriate, and might discolour the precipitate.

The chief objection to this process is, that it is rather expensive, from the large quantity of muriatic acid employed in proportion to the quantity of antimony. It might, however, be conjoined advantageously with the process for the preparation of hydriodate of potash, or of hydrosulphuret of ammonia, in which a stream of sulphuretted hydrogen gas is required.

### ARGENTUM—SILVER.

Nitras argenti. Nitrate of Silver. Ed.

"Take of the Purest Silver, extended in plates and cut, one part; Diluted Nitrous Acid, two parts; Distilled Water, one part. Dissolve the silver in the acid and water previously mixed in a phial, with a gentle heat, and evaporate the solution to dryness. The mass being put into a large crucible, let this be placed on the fire, which must be at first gentle, and gradually increased until the matter flow like oil. Then pour it into iron pipes, heated and rubbed with grease. Lastly, keep it in a glass vessel well stopt."

Argenti nitras. Nitrate of Silver. Lond.

"Take of Silver, an ounce; Nitric Acid, a fluid-ounce; Distilled Water, two fluid-ounces. Mix the nitric acid with the water, and dissolve the silver in it in a sand-bath, and gradually increase the heat, that the nitrate of silver may be dried. Melt in a crucible, with a gentle heat, until the water being expelled, ebullition ceases; then immediately pour it into proper moulds."

Argenti nitratis crystalli. Crystals of Nitrate of Silver. Dub.

"Take of Silver in plates, and cut, thirty-seven parts; Dilute

Nitric Acid, sixty parts. Put the silver into a glass vessel, and pour on it the acid previously diluted with water. Dissolve the acid with a heat gradually increased; then by evaporation and refrigeration, let crystals be formed, which are to be dried without heat, and to be preserved in a glass vessel in a dark place."

ARGENTI NITRAS FUSUM. Fused Nitrate of Silver. Dub.

"Dissolve Silver in dilute nitric acid as above described, then evaporate the liquor to dryness. Melt by a slow heat the residuum put into a crucible; then pour it into proper moulds, and keep it in a glass vessel."

THE silver in these processes is oxidated, and dissolved by the nitric acid, and the product, nitrate of silver, obtained in a dry state; nitric oxide gas is disengaged, which, as it meets with atmospheric air, is converted into the red vapours of nitrous acid. The metal is seldom free from an alloy of copper, which gives a greenish colour to the solution; but on slow evaporation the nitrate of silver crystallizes apart from any copper, and hence the Dublin College order these crystals to be procured separately for internal administration. The crystals are tables or rhombs; they have an intensely bitter taste; by exposure to light they are blackened from decomposition. When the nitrate of silver is procured dry and fused, it forms *lunar caustic*. The crucible should be large, as it swells much before melting, and the drops of it which are thrown out should be avoided, being highly caustic; the heat applied must be moderate, otherwise it will decompose the salt. Nitrate of silver given internally acts as a tonic, and has been found of considerable though irregular efficacy in the cure of epilepsy, chorea and other spasmodic diseases, (p. 106). The fused salt is a powerful escharotic, and has the advantage of being easily applied and confined, and of acting quickly; hence it is the escharotic in most common use, (p. 257). In ulcerated sore throat, of the tarsi palpebrarum, as an injection in fistulous sores, and as a lotion for aphthæ, it is of much service.

## ARSENICUM—ARSENIC.

SOLUTIO ARSENICALIS. Solution of Arsenic. Ed.

"Take of Oxide of Arsenic reduced to a very fine powder, Pure Subcarbonate of Potash, of each sixty-four grains; Distilled Water, fourteen ounces. Boil in a glass vessel on a slow fire, until the whole oxide be dissolved, and when cool, add Compound Spirit of Lavender, half an ounce; Distilled Water, as much as will make the whole liquor amount to sixteen ounces."

LIQUOR ARSENICALIS. Arsenical Solution. Lond. Dub.

"Take of Sublimed White Arsenic, rubbed to a very fine powder, Subcarbonate of Potash from Tartar, of each sixty-four (sixty, Dub.) grains; Compound Spirit of Lavender, four fluid-drachms; Distilled Water, a pint, (half a pint, Dub). Boil the White Arsenic and Subcarbonate of Potash in the water in a glass vessel until the arsenic is entirely dissolved. To the solution, when cold, add the Compound Spirit of Lavender: then add as much Distilled Water as may be necessary to make up the measure of a pint."

The substance named Oxide of Arsenic is now commonly considered as an acid, and named Arsenious Acid. It is not very soluble in water, hence in this preparation it is combined with potash, which renders the solution more perfect, and such as can be depended upon in regulating the dose. The formula was introduced by Dr. Fowler, as giving a substitute for the arsenical preparation known under the name of Tasteless Ague Drop. Each ounce of the solution contains four grains of the oxide. The dose is four drops three times a-day, as a remedy in intermittent fever, given with the precautions which have been pointed out under its medical history, (p. 121). The spirit of lavender is designed to communicate colour and flavour to prevent its being mistaken for water; but it would have been better to have added some other tincture, the flavour of which is less commonly known, and the taste less grateful, so as to have guarded against the possibility of the solution being incautiously swallowed. The Dublin College have reduced the quantity of arsenic from 64 to 60 grains in a pint, on the ground that it may be weighed with less chance of mistake by a drachm weight than by grains, a reason for which it was scarcely proper to alter the strength of so powerful a remedy.

ARSENICUM ALBUM SUBLIMATUM. Sublimed White Arsenic. Lond. Dub.

"Triturate White Arsenic into powder; then put it into a crucible, and applying heat, sublime it into another crucible placed over the former, (avoiding the vapours. Dub)."

OXIDE of Arsenic, or Arsenious Acid, is usually obtained by sublimation from the ores of cobalt, in which it is contained, and which are roasted with the view of obtaining the oxide of cobalt for the purposes to which it is applied in the arts. The arsenical oxide is collected in the chimney and flues of the furnace; it is impure, but is usually purified by sublimation before it is brought to the shops, and is in the state either of a solid cake or a powder. Oxide of arsenic is a substance so very active, that any foreign matter it can contain in this state can be of no importance, and the present process is altogether superfluous. It is used to form the arsenical liquor; it has also been given dissolved in water; but its solubility is so much affected by slight circumstances, that the strength of the solution cannot be depended on. Dr. Barker remarks, that after a time the solution lets fall the greater part of the oxide.

## BISMUTHUM—BISMUTII.

BISMUTHI SUBNITRAS. Subnitrate of Bismuth. Lond.

"Take of Bismuth, an ounce; Nitric Acid, a fluid-ounce and a half; Distilled Water, three pints. Mix six fluid-drachms of the Distilled Water with the Nitric Acid, and dissolve in these the Bismuth, then strain. Add the rest of the water to the strained solution, and put it aside that the powder may subside. Then having poured off the liquor above, wash the Subnitrate of Bismuth with distilled water, and dry it, wrapt up in bibulous paper, with a gentle heat."

**Bismuthi subnitras.** Subnitrate of Bismuth. Dub.

"Take of Bismuth reduced to powder, seven parts; Dilute Nitric Acid, twenty parts; Distilled Water, one hundred parts. Gradually add the bismuth to the acid, and dissolve with the aid of heat. Mix the solution with the water, and set it aside that the precipitate may subside. Wash this with distilled water, and dry it on bibulous paper with a gentle heat."

This preparation consists of oxide of bismuth and a small proportion of nitric acid. In obtaining it a nitrate of bismuth is first prepared, which subsists by so weak an affinity, that the addition of a large quantity of water abstracts the greater portion of the acid, and the oxide is precipitated combined with the remainder. This subnitrate is insoluble and tasteless. Its administration has been found useful in dyspepsia, cardialgia, and gastrodynia, (p. 127).

## CUPRUM—COPPER.

**Cupri subacetas præparatum.** Prepared Subacetate of Copper. Dub.

"Let the Subacetate of Copper be rubbed to powder, and the minute particles be separated in the manner directed for the preparation of chalk."

In the Dublin Pharmacopœia the name of subacetate of copper is given to verdigris, which is, strictly speaking, acetate of copper. The above process seems to be intended to reduce verdigris to a state of very fine powder by trituration and washing with water, as in the manner in which chalk is prepared, (p. 452.) This intention, however, will not be fulfilled, as Mr. Phillips has shown that verdigris is decomposed by water, being resolved into a binacetate of copper, and a green precipitate, which is a true subacetate, composed of one equivalent of acetic acid and two equivalents of peroxide of copper. Three equivalents of verdigris are resolved into an equivalent of each of these salts, as represented in the following diagram:

131 Verdigris { Acetic Acid . . 51 → 182 Binacetate of Copper.
{ Perox. Copper 80
131 Verdigris { Acetic Acid . . 51
{ Perox. Copper 80
131 Verdigris { Acetic Acid . . 51
{ Perox. Copper 80 → 211 Subacetate of Copper.

The verdigris should therefore be carefully triturated without the addition of water. The powder is used as a mild escharotic.

**Ammoniaretum cupri.** Ammoniaret of Copper. Ed. **Cuprum ammoniatum.** Ammoniated Copper. Dub.

"Take of Pure Sulphate of Copper, two parts; Subcarbonate of Ammonia, three parts. Rub them thoroughly in a glass mortar until all effervescence is finished, and they unite uniformly into a violet-coloured mass, which being wrapt in bibulous paper, is to be dried first on a chalk stone, and afterwards with a gentle heat. It is to be kept in a glass phial well stopt."

Cuprum ammoniatum. Ammoniated Copper. Lond.

"Take of Sulphate of Copper, half an ounce; of Subcarbonate of Ammonia, six drachms. Rub them together in a glass mortar until effervescence cease; then dry the ammoniated copper, wrapt up in bibulous paper, with a gentle heat."

The sulphate of copper employed is a bisulphate, containing likewise a large portion of water of crystallization. When it is triturated with the carbonate of ammonia, the excess of sulphuric acid attracts the ammonia, expelling the carbonic acid which is disengaged with effervescence, at the same time the water of the two salts is liberated, and renders the mass humid. The compound formed is a sulphate of ammonia and peroxide of copper, but not of very definite constitution. It is of a deep blue colour, which it retains when dried. It must be kept in a well-closed phial, otherwise the ammonia is exhaled and the colour lost. The preparation has been chiefly employed as a remedy in epilepsy; and for internal administration, it has the advantage over other salts of copper, of being less liable to excite vomiting.

Liquor cupri ammoniati. Solution of Ammoniated Copper. Lond.

"Take of Ammoniated Copper, a drachm; Distilled Water, a pint. Dissolve the ammoniated copper in the water, and filter the solution through paper."

Cupri Ammoniati aqua. Water of Ammoniated Copper. Dub.

"Take of Ammoniated Copper, one part; Distilled Water, one hundred parts. Dissolve and filter through paper."

The large quantity of water ordered in this formula decomposes part of the ammoniaret of copper, precipitating the peroxide. Mr. Phillips found, that to dissolve the salt without change, one-fourth of the quantity of water should be used. The decomposition is not, however, a disadvantage, as the solution is quite strong enough for the purpose to which it is usually applied, of cleansing foul ulcers; and if it is to be applied to the eyes, as has been recommended, to remove specks from the cornea, it must be rendered still weaker by dilution.

Solutio sulphatis cupri composita. Compound Solution of Sulphate of Copper. Ed.

"Take of Sulphate of Copper, Alum, of each three ounces; Water, two pounds; Sulphuric Acid, one ounce and a half. Boil the Sulphates in water, that they may be dissolved; then to the liquor strained through paper add the acid."

This is a combination of powerful astringents, forming a very styptic solution, formerly named Aqua Styptica. It has been applied topically to check hæmorrhage, and, largely diluted with water, as a wash in purulent ophthalmia.

## FERRUM—IRON.

**LIMATURA FERRI PURIFICATA.** Purified Filings of Iron. Ed.

"A sieve being placed over the filings, let a magnet be applied, that the filings may be drawn through the sieve upwards."

THE iron, from the facility with which it is attracted by the magnet, is, by this operation, if it is properly performed, obtained pure, the interposition of the sieve in a great measure preventing particles of other metals, or impurities which are mixed with iron-filings got from the work shops, from being entangled in the cluster which adheres to the magnet. The process, though not always attended to in the shops, is a necessary one, where iron is to be medicinally employed in this form, or is to serve for other preparations of this metal.

**SUBCARBONAS FERRI PRÆPARATUS.** Prepared Subcarbonate of Iron Ed.

"Purified Filings of Iron are to be frequently moistened with water till they fall into rust, which is to be rubbed to a fine powder."

**FERRI RUBIGO.** Rust of Iron. Dub.

"Take of Iron Wire, any quantity; which, being exposed to the air, moisten frequently with water until it pass into rust; then rub it in an iron mortar, and, by the affusion of water, wash away the finest powder; which dry."

IRON, exposed to air and moisture, attracts oxygen, and passes to the state of peroxide, at the same time it absorbs a little carbonic acid; by this change, termed *rusting*, it is converted into reddish-brown scales, which the Colleges order to be reduced to fine powder, the Dublin College directing it also to be submitted to elutriation. It has been given internally, as a tonic, in doses of 10 or 20 grains, and has sometimes appeared to possess considerable activity (p. 116); but it is suspected that, in these cases, the precipitated carbonate of iron was probably substituted for it. As an external application it has been employed in cancerous ulceration, the levigated powder being formed into a paste with water; this is spread over the surface of the sore, and is removed every twelve hours: its efficacy in real cancer is very doubtful; but, in some forms of ulceration it appears to mitigate the pain, correct the acrimony and fetor of the discharge, and cause the ulcer to heal.

**CARBONAS FERRI PRÆCIPITATUS.** Precipitated Carbonate of Iron. Ed.

"Take of Sulphate of Iron, four ounces; Subcarbonate of Soda, five ounces; Water, ten pounds. Dissolve the sulphate of iron in the water; then add the subcarbonate of soda, previously dissolved in a sufficient quantity of water, and mix them well together. Let the carbonate of iron, which is precipitated, be washed with warm water, and afterwards dried."

**FERRI SUBCARBONAS.** Subcarbonate of Iron. Lond.

"Take of Sulphate of Iron, eight ounces; Subcarbonate of Soda, six ounces; Boiling Water, a gallon. Dissolve separately the sul-

phate of iron and subcarbonate of soda in four pints of the water; mix the liquors together, and put aside, that the powder may subside; then, having poured off the liquor above, wash the subcarbonate of iron with warm water, and, having wrapt it up in blotting paper, dry it with a gentle heat."

FERRI CARBONAS. Carbonate of Iron. Dub.

"Take of Sulphate of Iron, twenty-five parts; Carbonate of Soda, twenty-six parts; Water, eight hundred parts. Dissolve the sulphate of iron in the water; then add the carbonate of soda, previously dissolved in a sufficient quantity of water, and mix them together. Wash the carbonate of iron which is precipitated with tepid water, and afterwards dry it."

ON mixing the solution of subcarbonate of soda and protosulphate of iron, the soda attracts the sulphuric acid, the carbonic acid combines with the protoxide of iron, the sulphate of soda remains in solution, and the carbonate of iron is precipitated of a green colour. These changes are represented in the following diagram:

| | | |
|---|---|---|
| 54 Carbonate of Soda | Soda . . . . 32 | 72 Sulphate of Soda. |
| | Carbonic A. 22 | |
| 76 Protosulphate of Iron | Sulphuric A. 40 | |
| | Protox. Iron 36 | 58 Protocarb. of Iron. |

The precipitate, when it subsides, is protocarbonate of iron, but in the operations of washing and drying it absorbs oxygen, and part of it becomes peroxide of iron, while so much carbonic acid escapes, that instead of 38, not above 15 *per cent.* of this acid remain in the compound. From these changes, the precipitate in washing and drying alters its colour from a dark green to a reddish-brown. The proportion of subcarbonate of soda ordered by the Colleges is different; but Dr. Barker found that which is given in the Dublin Pharmacopœia to be the best. Instead of subcarbonate of soda, subcarbonate of potash, which is cheaper, may be used; but in that case, the solutions must be employed warm, the sulphate of potash which is formed being sparingly soluble in cold water.

Carbonate of iron is an excellent chalybeate, active, yet mild, and not, like the rust of iron, liable to irritate the stomach. In neuralgia, it is a remedy of great value; it is said also to have sometimes been successful in curing tetanus. As the medicinal power depends in a great measure on its continuing in the state of protocarbonate, it has been recommended to employ it in the state of the extemporaneous preparation, Mistura Ferri Composita, (p. 117, 308,) in which there is no attempt to collect it when precipitated, and the iron cannot readily attract oxygen.

OXIDUM FERRI NIGRUM PURIFICATUM. Purified Black Oxide of Iron. Ed.

"Let the Scales of Black Oxide of Iron, which are found at the anvils of the workmen, be placed in contact with the magnet, so that the more pure and thin scales may be attracted by it."

FERRI OXIDUM NIGRUM. Black Oxide of Iron. Dub.

"Let the Scales of Oxide of Iron, which are found at the anvils of

the workmen, be washed with water, and when dry, let them be separated from impurities, by applying a magnet; then reduce them into powder, of which the finer particles are to be separated in the manner directed in the preparation of chalk."

THE scales of iron are the fragments struck from the metal when it is heated red hot, which become oxidated in passing through the air. The preparation consists chiefly of protoxide of iron, but not in a very pure state. According to some chemists, the black oxide of iron is a compound of the true protoxide, which is of a bluish colour, with the red peroxide. The black oxide is attracted by the magnet, the peroxide is not, and hence the method of separating them prescribed in the formula. It is used in making some of the other chalybeate preparations.

SULPHAS FERRI. Sulphate of Iron. Ed.

"Take of Purified Filings of Iron, six ounces; Sulphuric Acid, eight ounces; Water, two pounds and a half. Mix them, and the effervescence being over, digest for a short time in a sand-bath; then strain the liquor through paper, and, after due evaporation, put it aside that crystals may form."

FERRI SULPHAS. Sulphate of Iron. Lond.

"Take of Iron, of Sulphuric Acid, each eight ounces; Water, four pints. Mix the sulphuric acid with the water in a glass vessel, and add to them the iron; then, when the effervescence has ceased, strain the liquor through paper, and evaporate it, so that when it cools crystals may form. Having poured off the water, dry these on bibulous paper."

FERRI SULPHAS. Sulphate of Iron. Dub.

"Take of Iron Wire, four parts; Sulphuric Acid, seven parts; Water, sixty parts. Dissolve the metal by the aid of heat, and strain the solution through paper; lastly, after due evaporation, put it aside, so that by slow cooling crystals may form."

WHEN sulphuric acid, iron and water are placed together, they immediately act on each other. The iron takes an atom of oxygen from the water present, and becomes protoxide of iron, which combines with the sulphuric acid, while the hydrogen of the water, is evolved in the aëriform state; protosulphate of iron and hydrogen gas are therefore the products, and the reaction is such as is represented in the following diagram:

9 Water $\begin{cases}\text{Hydrogen . 1} \longrightarrow \text{1 Hydrogen Gas.}\\ \text{Oxygen . . 8}\end{cases}$
28 Iron . . . . . . . . . 28
40 Sulphuric Acid . . 40 ⟶ 76 Protosulph. of Iron.

The quantity of water ordered in the two first formulas is too small; hence the action often ceases from there not being enough of water present to dissolve the sulphate of iron as it is formed, and is renewed on the addition of more water.

Protosulphate of iron is also formed on the great scale by manufacturers for the purposes of dyeing, by exposure of the native sulphuret of iron, after being roasted, to air and moisture; but it is sel-

dom pure, and, for medicinal purposes, ought always to be prepared by this process. It is used as a tonic in a dose of from three to five grains, (p. 119). In too large a dose it occasions griping and vomiting.

SULPHAS FERRI EXSICCATUS. Dried Sulphate of Iron. Ed.

" Take of Sulphate of Iron, any quantity. Heat it in an unglazed earthen vessel, on a gentle fire, until it become white and perfectly dry."

EACH equivalent of crystallized sulphate of iron contains 7 equivalents of water. By continued heat, six of these, equal to about 38 *per cent.* of the weight of the salt, are expelled. The heat must not be raised too high, otherwise the salt will be decomposed. The preparation is used only for obtaining acetic acid, (p. 407,) and in the following formula.

OXIDUM FERRI RUBRUM. Red Oxide of Iron. Ed.

" Let Dried Sulphate of Iron be gradually exposed to a violent heat, until it is converted into a red coloured matter."

FERRI OXIDUM RUBRUM. Red Oxide of Iron. Dub.

" Expose Sulphate of Iron to heat until the water of crystallization be expelled ; then with a strong fire let it be roasted as long as acid vapours arise from it ; wash the red oxide, until, by the test of litmus, the water poured off appears to be free from acid ; dry it on bibulous paper."

BY an intense heat sulphate of iron is decomposed ; part of its acid yielding oxygen to the iron, and converting it into peroxide, is then expelled in the state of sulphurous acid. The rest of the sulphuric acid is volatilized in union with a small proportion of water, forming the acid vapours. These, if the process be conducted in the form of a distillation, (as it is in Germany,) condense into a dense fluid, the fuming sulphuric acid of Nordhausen. That no sulphuric acid may adhere to the peroxide, the Dublin College order it to be washed with water. It is used to form the Emplast. ox. ferri rubri.

SULPHURETUM FERRI. Sulphuret of Iron. Ed.

" Take of the Purified Filings of Iron, three parts ; Sublimed Sulphur, one part. Mix them, and expose in a covered crucible to a moderate heat, until they form a mass."

SULPHURETUM FERRI. Sulphuret of Iron. Dub.

" Heat with an intense fire in a blast furnace iron rods to a white heat, and immediately apply them to a roll of sulphur. Receive the sulphuret of iron in water ; separate it from the sulphur ; dry it and keep it in close vessels."

SULPHUR and iron unite in two proportions. When they are exposed to a heat below redness the bisulphuret of iron is formed, but when the heat is intense protosulphuret is produced. The object of these processes is to produce the protosulphuret, because it only is acted on by acids, so that it can be used in the formation of hydrosulphuret of ammonia, the only purpose for which it is employed. Hence the process of the Dublin College, although the more difficult,

is best fitted to furnish the proper product. The other process may be conducted in a Florence flask.

TINCTURA MURIATIS FERRI. Tincture of Muriate of Iron. Ed.

"Take of Purified Black Oxide of Iron, in powder, three ounces; Muriatic Acid, about ten ounces, or as much as may be sufficient to dissolve the powder. Digest with a gentle heat, and, when the powder is dissolved, add as much alcohol as that there shall be of the whole liquor two pounds and a half."

TINCTURA FERRI MURIATIS. Tincture of Muriate of Iron. Lond.

"Take of Subcarbonate of Iron, half a pound; Muriatic Acid, a pint; Rectified Spirit, three pints. On the subcarbonate of iron, in a glass vessel, pour the acid, and agitate them occasionally, for the space of three days. Put aside, that the impurities, if there are any, may subside, and having poured the liquor off, add the spirit to it."

MURIATIS FERRI LIQUOR. Tincture of Muriate of Iron. Dub.

"Take of Rust of Iron, one part; Muriatic Acid, Rectified Spirit, of each six parts. To the rust, put into a glass vessel, add the acid, and agitate occasionally during three days. Put aside, that the impurities may subside, and pour off the clear liquor. Reduce this by evaporation to a pint, and when cold add the spirit."

WHEN iron is dissolved in muriatic acid, a solution of the protomuriate is formed, of a green colour; this quickly absorbs oxygen from the air, and becomes permuriate of iron, which is of an orange colour. In the two last processes, the iron is already in the state principally of peroxide, and forms the permuriate at once. This compound is soluble in alcohol, while the protomuriate is not; hence the addition of the spirit assists in purifying the permuriate from any intermixture of the other salt. The solution, as prepared by the formula of the London College, contains, according to Mr. Phillips, about 34 grains of peroxide of iron in a fluid-ounce. In the Dublin formula a much larger quantity of acid is ordered than in the others, to ensure the solution of the iron, and the excess of acid is then removed by slow evaporation previous to adding the spirit.

This tincture of muriate of iron is a grateful preparation; the alcohol appears to suffer some chemical change from the action of the acid and the metallic oxide, the odour becoming ethereal. It is a preparation also highly active. Besides the use of it to relieve dysuria, mentioned p. 118, it is given along with muriate of lime in scrofula, as an astringent in hæmorrhage, and as an external application to cancerous sores.

TARTRAS POTASSÆ ET FERRI. Tartrate of Potash and Iron. Ed.

"Take of Purified Filings of Iron, one part: Supertartrate of Potass in powder, two parts; Water, one part. Triturate them together, and then expose in a shallow earthen vessel to the air for fifteen days, stirring daily with a spatula, and adding water occasionally to preserve the mass moist. Then boil it for a short time in four times its weight of water, and pour off the solution from any impurities. It is then to be evaporated to dryness by the heat of a water-bath, and after reducing it to powder, preserve it in a vessel well closed."

Ferrum tartarisatum. Tartarised Iron. Lond.

"Take of Iron, one pound; Supertartrate of Potash in powder, two pounds; Distilled Water, five pints, or as much as may be necessary. Rub the iron and supertartrate of potash together, and expose them, mixed with a pint of water, to the air, in an open glass vessel, for twenty days, shaking them daily, and occasionally adding distilled water that they may be always moist. Then boil them with four pints of distilled water for a quarter of an hour, and strain. Evaporate the liquor in a water-bath till the tartarised iron is thoroughly dried. Rub it into powder, and preserve it in a well-closed vessel."

Ferri tartarum. Tartar of Iron. Dub.

"Take of Iron Wire, one part; Bitartrate of Potash in very fine powder, four parts; Distilled Water, eight parts, or as much as may be sufficient. Mix them together, and expose them to the air in a wide vessel for fifteen days. Stir the mixture from time to time, and by adding water daily keep it always moist, taking care that the iron shall not be entirely covered with water. Lastly, boil it in a sufficient quantity of distilled water, and evaporate the strained liquor in a water-bath to dryness. Keep the tartrate of iron in a well-closed phial."

By these processes is formed a double salt, the tartrate of potash and iron, composed of one equivalent of tartrate of potash, 114, one equivalent of tartrate of iron, 102, and two equivalents of water, 18, =244. In the formula given for its preparation, iron is oxidated by exposure to air and moisture in contact with bitartrate of potash, and the double tartrate of iron and potash produced is separated from a quantity of iron which remains in the metallic state by solution in water.

The solution is of a deep greenish-brown colour, and may be long kept without changing. But the processes of boiling and evaporation directed in the Pharmacopœias decompose part of the double tartrate, and lessen its medicinal power; hence it is better to preserve the compound in the solution in which it is originally formed. The powder which is procured by evaporation is greenish-brown, tenacious and deliquescent; it cannot again be wholly redissolved. In the Dublin formula, the quantity of iron has been diminished to a half, and is still sufficiently large. When properly prepared, the tartrate of potash and iron is a chalybeate of considerable activity, yet not irritating. It has little of the taste which renders the other salts of iron unpleasant, and being always given in solution may be largely diluted, which renders its action still milder.

Murias ammoniæ et ferri. Muriate of Ammonia and Iron. Ed.

"Take of Red Oxide of Iron washed, and again dried, Muriate of Ammonia, of each equal weights. Mix them well together, and sublime by a strong fire; reduce the sublimed mass to powder, and preserve it in vessels well corked."

Ferrum ammoniatum. Ammoniated Iron. Lond.

"Take of Subcarbonate of Iron, Muriatic Acid, and Muriate of Ammonia, of each a pound. Pour the Muriatic Acid upon the Sub-

carbonate of Iron, and put them aside until the effervescence has ceased. Strain the solution through paper, and boil down the strained liquor till the water is entirely dissipated. Mix carefully what remains with the muriate of ammonia; then applying a strong heat, sublime quickly; lastly, rub into powder."

In the first of these processes peroxide of iron and muriate of ammonia are heated together to the point at which the latter sublimes. At first the salt is decomposed by the iron, muriate of iron being formed and ammonia exhaled, but as the heat increases the muriate of iron and muriate of ammonia rise in vapour together, and a triple compound of muriatic acid, ammonia and peroxide of iron is the product. In the London process, permuriate of iron is prepared, and is then sublimed with muriate of ammonia; the sublimation is scarcely requisite. The Dublin College have rejected the preparation from their Pharmacopœia, as uncertain and of little efficacy.

Muriate of ammonia and iron is in crystalline grains of a yellow colour, and somewhat deliquescent. It was principally employed as a remedy in rickets, in a dose to children of two or three grains, also in cases of hypochondriasis and hysteria, in epilepsy and scrofula; but is now little used, the tincture of muriate of iron being preferred.

Tinctura ferri ammoniati. Ammoniated Tincture of Iron. Lond.

"Take of Ammoniated Iron, four ounces; Proof-spirit, one pint. Digest and strain."

This solution of the preceding compound is an unnecessary preparation, as it differs little from tincture of muriate of iron, and is extremely uncertain in strength. Its dose is thirty drops.

Acetas ferri. Acetate of Iron. Dub.

"Take of Carbonate of Iron, one part; Acetic Acid, six parts. Digest them for three days, and strain the liquor."

In this process the acetic acid dissolves the iron, and affords a mild and active chalybeate, not differing much in its operation from the tartrate of iron.

Tinctura acetatis ferri. Tincture of Acetate of Iron. Dub.

"Take of Acetate of Potash, two parts; Sulphate of Iron, one part; Rectified Spirit, twenty-six parts. Rub together the acetate of potash and the sulphate of iron in an earthen mortar, until they unite into a soft mass. Dry this with a moderate heat; rub the dried matter with the spirit; put the mixture into a phial closely corked, and digest for seven days, agitating it frequently; lastly, pour off the tincture from the impurities, and keep it in a well-closed vessel."

Tinctura acetatis ferri cum alcohol. Tincture of Acetate of Iron with Alcohol. Dub.

"Take of Sulphate of Iron, Acetate of Potash, each one ounce; Alcohol, two pints. Rub the acetate of potash and sulphate of iron in an earthen mortar until they unite into a soft mass; then dry with a moderate heat, and when cold rub it with the alcohol. Put the mixture into a phial well stopt, and digest for twenty-four hours, shak-

ing occasionally; lastly, pour off the clear tincture from the impurities."

THESE tinctures differ chiefly in the former containing both protacetate and peracetate of iron, the one dissolved by the water, the other by the spirit, while the latter contains only the peracetate, the other salt being insoluble in alcohol. The latter may have the advantage of being less liable to spontaneous decomposition; but it is altogether superfluous to have two tinctures differing so little, or indeed to have more than one form of acetate of iron, if there was any necessity for its introduction as an officinal preparation, which is doubtful. The preparations of this metal in the Pharmacopœias are more numerous than what are required in practice.

LIQUOR FERRI ALKALINI. Alkaline Solution of Iron. Lond.

"Take of Iron, two drachms and a half; Nitric Acid, two fluidounces; Distilled Water, six fluid-ounces; Solution of Subcarbonate of Potash, six fluid-ounces. Pour the acid and the water mingled together on the iron; and when the effervescence has ceased, pour off the liquor while still acid. Add this gradually, and at intervals, to the solution of subcarbonate of potash, agitating frequently, until the colour having become of a brownish-red, effervescence is no longer excited. Put them aside for six hours, and then pour off the liquor."

THIS is a preparation which has long been known under the name of Martial Alkaline Tincture, and the nature of it is not very well ascertained. The iron is oxidated and dissolved by the nitric acid; on adding the solution to the subcarbonate of potash, the alkali saturates a portion of the acid, and the oxide of iron is precipitated; but by agitation it is kept suspended, and by the excess of alkali is redissolved, this being accompanied with effervescence from the disengagement of part of the carbonic acid. If the reverse mode of adding the alkaline carbonate to the solution of iron is followed, much of the oxide is precipitated, and is not redissolved by the alkali. On standing, a portion of nitre, formed from the union of the potash and nitric acid, is deposited, from which the clear liquor is to be poured off; and by this formation of nitre, it is not improbable that the whole, or the greater part of the nitric acid, is withdrawn. It will then be a solution of carbonate of iron and potash.

This solution is of a deep reddish-brown colour, transparent, or frequently somewhat turbid, especially from the action of the air. It has a styptic alkaline taste; it deposits the iron in a state of peroxide on being kept, and even from dilution with water. On account of its uncertain strength and facility of decomposition, it has been discarded from use.

## HYDRARGYRUS—QUICKSILVER.

HYDRARGYRUS PURIFICATUS. Purified Quicksilver. Ed.

"Take of Quicksilver, six parts; Iron Filings, one part. Rub them together, and distil from an iron vessel."

HYDRARGYRUM PURIFICATUM. Purified Quicksilver. Lond.

"Pour Quicksilver into an iron retort, and applying heat below it, let the purified mercury be distilled."

HYDRARGYRUM PURIFICATUM. Purified Quicksilver. Dub.

"Take of Quicksilver, six parts. Distil slowly four parts."

THE quicksilver of Commerce is often adulterated with other metals. To obtain it pure is the design of this process. The iron-filings are added chiefly to render the ebullition less violent, on the same principle that coils of platina wire are thrown into sulphuric acid when it is boiled in glass vessels, (see p. 420). The distillation of mercury is rather difficult of execution, from the weight of the mercury, and the high temperature that requires to be applied. Glass retorts can scarcely be used, as the force of the ebullition may break them; retorts of iron or of porcelain are commonly employed. Mercury may be partially purified in an easier manner, by agitating it with sulphuric acid, which dissolves the impurities, and, by washing with water, these are removed in union with the acid. The London and Dublin formulas are deficient in omitting the iron, and the latter in directing only four pounds out of six to be distilled,—an unnecessary waste, to which it is not to be supposed the apothecary will submit.

HYDRARGYRI ACETAS. Acetate of Quicksilver. Ed.

"Take of Purified Quicksilver, three ounces; Diluted Nitrous Acid, four ounces and a half, or a little more than may be requisite to dissolve the quicksilver; Acetate of Potash, three ounces; Boiling Water, eight pounds. Mix the quicksilver with the diluted nitrous acid; and towards the end of the effervescence, digest, if necessary, with a gentle heat, until the quicksilver be entirely dissolved. Then dissolve the acetate of potash in the boiling water, and immediately on the solution pour the other, and mix them both by agitation. Then put aside, that crystals may be formed. These being placed in a funnel, wash them with cold distilled water; and, lastly, dry them with a very gentle heat. In preparing the acetate of quicksilver, it is necessary that all the vessels and the funnel which are employed should be of glass."

HYDRARGYRI ACETAS. Acetate of Quicksilver. Dub.

"Take of Purified Quicksilver, Acetate of Potash, of each nine parts; Diluted Nitric Acid, eleven parts; Boiling Distilled Water, one hundred parts; Distilled Vinegar, as much as may be requisite. Add the nitric acid to the quicksilver, and the effervescence being over, digest the mixture, that the metal may be dissolved; dissolve the acetate of potash in the water, and add distilled vinegar until acid predominate in the liquor. To this, boiling hot, add the solution of mercury in nitric acid, and pass the mixture quickly through double linen; let it cool that crystals may form; these being washed with distilled cold water, dry on paper with a very gentle heat. In the whole operation glass vessels must be used."

ACETIC acid, like the other acids, combines with mercury in different states of oxidation, and forms salts which are different in their properties. When the metal is in a high state of oxidation, a salt is formed, which is acrid and soluble; when in a lower state of oxida-

tion, one is obtained more mild and sparingly soluble. The object of the present process is to obtain the latter of these salts, the protacetate of mercury, by first forming a protonitrate, and decomposing this by acetate of potash, the nitric acid unites with the potash, and the acetic acid with the protoxide of mercury, as represented in the following diagram:

| | | |
|---|---|---|
| 99 Acetate of Potash | Potash . . . . . 43 | 102 Nitrate of Potash. |
| | Acetic Acid . . . 51 | |
| 262 Protonitrate of Mercury | Nitric Acid . . . 54 | |
| | Protox. Mercury 208 | 259 Acetate of Mercury. |

Protacetate of mercury and nitrate of potash are thus formed in the solution, and to separate these, advantage is taken of a property of the former salt, that though readily soluble in hot water, it is sparingly so in that fluid cold; the solution of acetate of potash is added very hot, and as the mixture cools, the acetate of mercury is deposited in crystals.

In performing the process it is better to allow the solution of mercury in nitric acid to go on in the cold than to apply heat, as the Edinburgh College direct, for heat renders the action more rapid, and a quantity of pernitrate of mercury is produced. Even in the cold a portion of this salt is formed; and it is to keep it in solution, that, in the first formula, an excess of nitric acid, and, in the second, an addition of acetic acid is employed; the direction, likewise, of the Dublin College, to strain the mixed solutions while hot, is to remove a portion of supernitrate of mercury which is precipitated. The nitrate of mercury should be poured into the solution of acetate of potash, not the reverse, as in the latter mode a precipitation of subnitrate of mercury will happen. Instead of employing boiling water to dissolve the acetate of potash, it is preferable to use only tepid water, as, at a high temperature, the water is liable to produce a partial decomposition of the acetate, so that it becomes of a yellow colour from a slight excess of oxide. It is necessary, too, not to continue to wash the salt after it is formed with much water, for a similar partial decomposition takes place, and the crystals become yellow. If this should happen, the brilliant whiteness is restored by washing them with a little diluted distilled vinegar, the acetic acid neutralizing the excess of oxide to which the yellow colour is owing. With these precautions, the process, which often fails when they are not attended to, is easily conducted, and the preparation is obtained uniform, and in a proper state. Mr. Phillips objected to the Edinburgh process, that too much nitric acid is ordered in the process, and that the solution of acetate of mercury produced is too much diluted; but, to prevent the decompositions which have been stated, the quantities of acid and of water appear to be quite necessary, and Dr. Duncan is of opinion that the quantity of water might be increased with advantage.

Acetate of mercury crystallizes in small brilliant scales. As an antisyphilitic remedy it is very mild in its operation; but its effects are not considered as sufficiently permanent to allow of its being relied on in effecting a radical cure.

HYDRARGYRI PERSULPHAS. Persulphate of Mercury. Dub.

"Take of Purified Mercury, Sulphuric Acid, of each six parts; Nitric Acid, one part. Expose them to heat in a glass vessel, and let the fire be increased until the mass become perfectly dry and white."

THIS is now ordered in the Dublin Pharmacopœia as a separate process, but has long formed a part of that which follows, for the preparation of corrosive sublimate. The compound which is intended to be formed is bipersulphate of mercury, composed of two equivalents of sulphuric acid and one equivalent of peroxide of mercury. It is formed by boiling sulphuric acid and mercury to dryness, the proportions being four equivalents of the former and one of the latter. The mercury takes an atom of oxygen from each of two equivalents of the acid, which are converted into sulphuric acid, and escape; and the mercury, thus raised to the state of peroxide, combines with the other two equivalents of sulphuric acid. These changes may be illustrated by the following diagram:

| | | |
|---|---|---|
| 40 Sulphuric Acid | Sulphurous A. 32 | 32 Sulphurous Acid. |
| | Oxygen . . . 8 | |
| 40 Sulphuric Acid | Sulphurous A. 32 | 32 Sulphurous Acid. |
| | Oxygen . . . 8 | |
| 40 Sulphuric Acid . . . . . . . | 40 | |
| 40 Sulphuric Acid . . . . . . | 40 | |
| 200 Mercury . . . . . . . . | 220 | 296 Bipersulph. of Mercury. |

The small quantity of nitric acid (in comparison to the others not half an equivalent) is added to ensure the conversion of the whole of the mercury into peroxide. It renders the product whiter and more uniform. The salt is used only for preparing corrosive sublimate and subsulphate of mercury.

MURIAS HYDRARGYRI CORROSIVUS. Corrosive Muriate of Quicksilver. Ed.

"Take of Purified Quicksilver, two pounds; Sulphuric Acid, two pounds and a half; Muriate of Soda, dried, four pounds. Boil the quicksilver with the sulphuric acid, in a glass vessel placed in a sand-bath, until the matter become dry. Mix this when cold in a glass vessel with the muriate of soda; then sublime it in a glass cucurbit with a heat gradually raised. Separate the sublimed matter from the scoriæ."

HYDRARGYRI OXYMURIAS. Oxymuriate of Quicksilver. Lond.

"Take of Purified Quicksilver, by weight, two pounds; Sulphuric Acid, by weight, thirty ounces; Muriate of Soda, dried, four pounds. Boil the quicksilver with the sulphuric acid in a glass vessel until the sulphate of mercury become dry. Rub this, when it has cooled, with the muriate of soda, in an earthen mortar, then sublime it from a glass cucurbit with a heat gradually raised."

HYDRARGYRI MURIAS CORROSIVUM. Corrosive Muriate of Quicksilver. Dub.

"Take of Persulphate of Quicksilver, five parts; Dried Muriate of Soda, two parts. Rub them to very fine powder in an earthen

mortar, then, with a fire gradually raised, sublime the corrosive sublimate into a proper receiver."

The object of these processes is to form the important mercurial compound named Corrosive Sublimate, or bichloride of mercury. The two first processes commence with preparing the bipersulphate of mercury, in nearly the same manner as directed by the Dublin College in the formula which has just been considered; in the third process, that of the Dublin College, this compound is taken as above prepared. The other Colleges, instead of nitric acid, employ an excess of sulphuric acid to ensure the conversion of the mercury into peroxide.

The next operation, which is common to these processes, is to heat the bipersulphate of mercury with dry sea salt, (chloride of sodium,) in the proportion of one equivalent of the former and two of the latter; the sodium takes the oxygen and sulphuric acid of the bipersulphate, and becomes sulphate of soda, while the mercury combines with the chlorine, and is converted into bichloride of sodium, which sublimes. The following diagram illustrates these changes:

| | | | |
|---|---|---|---|
| 296 Bipersulphate of Mercury | Mercury . . | 200 | 272 Bichloride of Mercury. |
| | Oxygen . . | 8 | |
| | Sulphuric A. | 40 | |
| | Oxygen . . . | 8 | |
| | Sulphuric A. | 40 | |
| 120 Chloride of Sodium, (2 equival.) | Chlorine . . | 36 | |
| | Chlorine . . | 36 | |
| | Sodium . . . | 24 | 72 Sulphate of Soda. |
| | Sodium . . . | 24 | 72 Sulphate of Soda. |

The proportions of chloride of sodium and persulphate of mercury, ordered by the Dublin College, accord with this view of the reaction, and Dr. Barker found that they answered well in practice, while the other Colleges order a quantity of chloride of sodium to be used a great deal larger than is necessary. An excess of so cheap a material may be useful to secure the mercurial salt being fully decomposed, but it need not be so much above the true proportion; and Dr. Barker informs us, that if the materials are well mixed by trituration, the whole of the mercury will be converted into corrosive sublimate, when proportions scarcely different from the atomic weights are employed.

Corrosive sublimate is obtained in the form of a dense mass; when sublimed slowly it condenses in slender prismatic crystals; and it is obtained in a similar form by crystallization from its watery solution. It is easily soluble in water, requiring 20 parts at 60° for its solution, and 2 parts at 212°. It is still more soluble in alcohol, requiring scarcely 4 parts at 60°. Its taste is acrid and metallic. It changes to green several vegetable colours; is decomposed by the alkalis and earths, and by a number of compound salts, and likewise by vegetable infusions.

It is the most powerful of the mercurial preparations. Its dose cannot safely exceed the fourth of a grain, nor can more than one grain be given in twenty-four hours. As an antisyphilitic remedy it

has long been employed, but the use of it is now almost limited to empirics, as it is uncertain and hazardous, (p. 114). Internally it is given in the form of solution in water or alcohol, the dose being increased cautiously from the eighth to the fourth of a grain, night and morning, and mucilaginous diluents being taken to lessen the irritation it is liable to occasion. As the solution has a very disagreeable taste, the corrosive sublimate is sometimes made into pills, a little of it being mixed with an equal weight of muriate of ammonia, which renders it more soluble in water, this being dissolved by adding the necessary proportion of water, and the solution being formed into a mass with crumb of bread, and divided into pills, so that each pill contains the eighth of a grain of corrosive sublimate. Externally, under the form of solution, it is employed as an escharotic in chancre and venereal ulcers of the mouth ; and a very dilute solution of it has been used as an injection, to excite inflammation in obstinate gleet.

LIQUOR HYDRARGYRI OXYMURIATIS. Solution of Oxymuriate of Mercury. Lond.

"Take of Oxymuriate of Mercury, eight grains ; Distilled Water, fifteen fluid-ounces ; Rectified Spirit, one fluid-ounce. Dissolve the oxymuriate in the water, and add the spirit."

THIS formula is designed to afford a form of preparation under which the dose of corrosive sublimate may be easily regulated. A fluid-ounce contains half a grain ; its dose therefore may be from one to two drachms. It has been recommended to add to this solution eight or ten grains of muriate of ammonia, which will prevent any chance of spontaneous decomposition.

SUBMURIAS HYDRARGYRI MITIS, *sive Calomelas.* Mild Submuriate of Quicksilver. Calomel. Ed.

"Take of Muriate of Quicksilver, four parts ; Purified Quicksilver, three parts. Reduce the muriate to powder in a glass mortar, with a little water, so as to avoid the acrid powder ; then add the quicksilver, and rub until it disappears ; put the dried mass into an oblong phial, of which it shall only fill one-third, and sublime over a sand-bath. The sublimed matter is again to be rubbed to powder, and afterwards sublimed ; it is then to be reduced to a very fine powder, which is lastly to be washed with boiling distilled water."

HYDRARGYRI SUBMURIAS. Submuriate of Quicksilver. Lond.

"Take of Purified Quicksilver, four pounds ; Sulphuric Acid by weight, thirty ounces ; Muriate of Soda, a pound and a half ; Muriate of Ammonia, eight ounces. Boil two pounds of the Quicksilver in a glass vessel, until the Sulphate of Mercury becomes dry. When it has cooled, rub it with the other two pounds of quicksilver in an earthen mortar, till they are thoroughly mixed. Then add the Muriate of Soda, and rub them together till the globules disappear ; then sublime. Reduce the sublimate to a very fine powder, pass it through a sieve, and mix it well with the Muriate of Ammonia previously dissolved in a gallon of boiling distilled water. Put the mixture aside that the powder may subside. Pour off the liquor, and wash the powder repeatedly with boiling distilled water, until Solu-

tion of Ammonia dropped in causes no precipitate. Lastly, reduce it to a very fine powder in the manner prescribed for preparing chalk."

CALOMELAS SUBLIMATUM. Sublimed Calomel. Dub.

"Take of Persulphate of Quicksilver, twenty-five parts; Purified Mercury, seventeen parts; Dried Muriate of Soda, ten parts. Rub the persulphate of mercury and the purified quicksilver together in an earthen-ware mortar, until the metallic globules disappear; then add the dried muriate of soda. Let them be well mixed, and sublime from a proper vessel into a receiver, by a heat gradually raised. Reduce the sublimed mass to powder, which wash with distilled water, until the liquor poured off no longer afford any precipitate on a few drops of water of caustic potash being added to it; lastly, dry the calomel."

THIS substance, *Calomel*, or chloride of mercury, is the most important preparation of mercury, both from the certainty of its operation, its mildness, combined with sufficient activity, and the numerous indications it is capable of fulfilling. The processes by which it is obtained are fortunately little liable to be varied by circumstances, but afford an uniform product.

In the process of the Edinburgh College, corrosive sublimate, which, as has been mentioned, is bichloride of mercury, is first triturated, and then sublimed with an additional equivalent of metallic mercury, which entering into the composition converts the bichloride into chloride of mercury or calomel. The diagram explains the theory of the reaction:

272 Bichloride of Mercury { Mercury 200 → 236 Calomel.
Chlorine 36
Chlorine 36
200 Mercury ............ 200 → 236 Calomel.

It is doubtful whether the mercury enters into the combination in the trituration or in the sublimation, but it is more probably in the latter. The trituration must be managed with caution, to avoid the fine particles which rise from the sublimate, and may injure the eyes and nostrils; the addition of a little water, as the College direct, is useful in obviating this inconvenience.

The combination whence calomel is formed is scarcely complete at the first sublimation; a portion of quicksilver rises on the first application of the heat, and adheres to the portion of sublimate condensed on the sides of the vessel in minute globules; and a small quantity of unchanged corrosive sublimate appears also to be diffused through the mass. To render the combination complete, the sublimed mass is reduced to powder, and is sublimed a second time. The London College ordered formerly a third sublimation, and the old practice was to sublime it six or seven times. This is, however, altogether unnecessary; and it has even been ascertained, that at each sublimation a little corrosive muriate is reproduced. To remove any portion of this deleterious substance that may adhere to the calomel, it is after the second sublimation reduced to a fine powder by trituration and levigation with water, and well washed with water, until the

water pass off tasteless, and, according to the test given by the Dublin College, until it give no indications of precipitation on adding a few drops of a solution of potash. A method has been introduced by Mr. Jewell, of conducting the sublimation in an apparatus so constructed, that the vapours are not condensed in the upper part of the vessel, forming a solid mass, but are condensed on the surface of the water, and the calomel is obtained in the state of an impalpable powder.

A different process from that which has been described is given by the Colleges of London and Dublin. In this the previous formation of corrosive sublimate is dispensed with, the calomel being formed directly from the materials. By boiling together sulphuric acid and mercury, bipersulphate of mercury is produced in the manner already explained, (p. 484) : this is triturated with an additional equivalent of mercury, until the globules disappear, is then mixed with two equivalents of chloride of sodium, and the mixture submitted to a heat sufficient to cause sublimation. The two atoms of oxygen and two equivalents of sulphuric acid which existed in the bipersulphate pass to the sodium, and form two equivalents of sulphate of soda; and the two atoms of chlorine, which were united with the sodium, combine with the mercury of the bipersulphate and the mercury that was added, and produce two equivalents of calomel. The following diagram represents this rather complicated reaction :

| | | | |
|---|---|---|---|
| 200 Mercury ...... | ............... | 200 | 236 Calomel. |
| 296 Bipersulphate of Mercury | Mercury ....... | 200 | 236 Calomel. |
| | Oxygen (2 atoms) | 16 | |
| | Sulph. A. (2 equiv.) | 80 | |
| 120 Chloride of Sodium (2 equiv.) | Chlorine ........ | 36 | |
| | Chlorine ........ | 36 | |
| | Sodium (2 atoms)... | 48 | 144 Sulph. of Soda, (2 equiv.) |

In this manner, calomel is formed as easily as corrosive sublimate, one sublimation only being required, the process indeed being the same for either, only that double the quantity of mercury is used in the preparation of calomel. The object of the rest of the process is to ensure the complete purification of the calomel from any corrosive sublimate which might be produced in the process, and be sublimed along with it. Repeated washing with water would accomplish this ; but the addition of muriate of ammonia is an improvement, as it has the property of rendering corrosive sublimate more soluble in water. Common salt has the same property, and might be employed as cheaper. The solution of sal ammoniac should be used cold, not at a boiling temperature, as it is then liable to decompose a portion of the calomel, resolving it into corrosive sublimate and quicksilver.

Calomel obtained by sublimation is in a dense cake, which is evidently an aggregate of short prisms. It is semi-transparent, has a slight yellowish colour, which is liable to be darkened by light, is tasteless and heavy, its specific gravity being 7.2. It is less volatile than corrosive sublimate ; it appears to be altogether insoluble in water. The names given to it by two of the Colleges, of Submu-

riate and Mild Muriate of Mercury, are incorrect; but the application of the term of Chloride might cause confusion, which is more particularly to be guarded against, where a difference of properties exists so important as between this preparation and the bichloride. It is safer, indeed, in prescribing it, to use the arbitrary name of Calomel, respecting which there can be no mistake, than any of the other appellations given to it by the Colleges.

Calomel is one of our most valuable remedies. It is extensively used as a mercurial, its operation being mild, and at the same time certain and active; and its use is only limited by the tendency it has to occasion purging. As a remedy in syphilis, it is given in the dose of a grain night and morning, its determination to the intestines being prevented, if necessary, by addition of a little opium. It is the preparation which is usually given in the other diseases in which mercury is employed. It is thus administered in affections of the liver or neighbouring organs, in which advantage appears to be derived, both from its local determination and its purgative operation;—in some forms of inflammatory diseases, particularly chronic rheumatism and croup, in which its beneficial effects appear to arise both from its purgative effect and from its general action on the system;—in dysentery, in which its successful application appears to depend partly on its operation as a cathartic, and partly as a mercurial;—in various forms of febrile affection, particularly yellow fever and other fevers of warm climates, in which this combined operation of it is not less advantageous, (see p. 115);—in cutaneous diseases, in which it appears to operate simply as a mercurial alterative;—in various diseases belonging to the class Neuroses, particularly tetanus and hydrophobia, in which it affords the most speedy mode of establishing the general action of mercury on the system;—and in hydrocephalus, where it is probably farther advantageous by increasing absorption. It is in common use as a cathartic, either by itself in a dose from five to ten grains, or in a smaller quantity, to promote the operation of other purgatives. Its anthelmintic power is justly celebrated; and it is superior to the other mercurials in assisting the operation of diuretics in dropsy. From its great specific gravity, it ought always to be given in the form of bolus or pill.

SUBMURIAS HYDRARGYRI PRÆCIPITATUS. Precipitated Submuriate of Mercury. Ed.

"Take of Diluted Nitrous Acid, Purified Quicksilver, of each eight ounces; Muriate of Soda, four ounces and a half; Boiling Water, eight pounds. Mix the quicksilver with the diluted nitrous acid, and, towards the end of the effervescence, digest with a gentle heat, shaking the vessel frequently. It is necessary, however, that more quicksilver should be mixed with the acid than this can dissolve, that the solution may be obtained fully saturated. Dissolve at the same time the muriate of soda in the boiling water; pour the other solution on this while warm, and mix them quickly together. After the precipitate subsides, pour off the saline liquor, and wash the submuriate of mercury, by frequently adding warm water, pouring it off after each time the precipitate subsides, until it come off tasteless."

CALOMELAS PRÆCIPITATUM. Precipitated Calomel. Dub.

"Take of Purified Quicksilver by weight, seventeen parts; Diluted Nitrous Acid, fifteen parts. Pour the acid on the quicksilver in a glass vessel, and when the mixture first ceases to effervesce, digest with a moderate heat for six hours, agitating occasionally; then increase the heat, so that the liquor boil a little; pour it off from the remaining mercury, and mix it quickly with four hundred parts of boiling water, in which seven parts of muriate of soda have been previously dissolved: wash the powder which is precipitated with warm distilled water, as long as the liquor poured off affords any precipitate on the addition of a few drops of water of subcarbonate of potash; lastly, dry it."

THE design of this process is to obtain calomel in the humid way, from the decomposition of protonitrate of mercury by chloride of sodium. The advantages supposed to belong to it are, that it is more easily executed, less expensive, and affords the product in a finer powder than that obtained by sublimation can be reduced to. It was introduced on the authority of Scheele, and the directions which are given are those which he pointed out. The theory of metallic solutions was, however, in his time, imperfectly understood, and the process to afford the proper product ought to be conducted in a very different manner from that ordered in the Pharmacopœias.

Scheele was evidently misled by the analogy of the increase of solubility of a salt in water by increase of heat. By aiding the action of the acid on the quicksilver by heat, it was supposed that a larger product would be obtained, and that the acid, being thoroughly saturated, the product would be more mild. Two circumstances, however, operate in this case, and give rise to other results, which defeat the intention of the process, and have always rendered its success very imperfect.

1*st*, By digesting or boiling the acid on the metal, the decomposition of the acid is facilitated, and a great part of the mercury passes to the state of peroxide; hence, when the solution is added to the solution of muriate of soda, the degree of oxidation being too great to admit of the whole being converted into mild muriate, a portion of corrosive muriate is formed. It has been observed, indeed, that although in the first stage of the solution much nitric oxide gas is disengaged, indicating a decomposition of the acid to a considerable extent, yet, after this, an additional portion of quicksilver is dissolved without much effervescence, whence it has been concluded, that this portion must receive oxygen from the portion already dissolved, and that the whole, therefore, still exists in a low state of oxidation. A part of the peroxide may in this manner be reduced to protoxide, but much of it continues as peroxide, and in the subsequent reaction is converted into corrosive sublimate, a proof of which, and of the impropriety of the formula, is, that from a given weight of quicksilver dissolved in nitric acid, with the aid of heat, less calomel is obtained, than from a solution prepared entirely in the cold. I have ascertained this by experiment, the quantity of calomel obtained from a solution of one ounce of quicksilver in diluted nitric acid in the cold, being a little more than an ounce, while, from the same quantity

dissolved with the application of heat, the precipitate did not much exceed half an ounce, while the liquor held dissolved corrosive sublimate.

*2dly,* In consequence of the excess of mercury employed, and the long digestion, the nitric acid is so saturated with the oxides of mercury, that the solution is partially decomposed by mere dilution with water,—a quantity of subnitrate of mercury being precipitated. Hence, when such a solution is mingled with the solution of muriate of soda, this decomposition takes place to a certain extent, from the operation of the water of the solution, and a quantity of this subnitrate is mixed with the calomel, and must so far modify its powers.

These sources of error are obviated by using a solution of mercury prepared in the cold, and with a diluted acid; and from such a solution, the product, I have found, is almost entirely calomel, with very little corrosive muriate. The method of conducting the process is the following: Add the quicksilver in small portions at a time to the nitric acid previously diluted with one part and a half of water, (observing the proportions given in the Edinburgh Pharmacopœia,) and avoid the application of heat; when the solution is completed, or no mercury appears to be capable of being dissolved, add a little water to dissolve any part of the nitrate of mercury that may have crystallized; then pour off the clear solution from the undissolved quicksilver, and add it to the solution of muriate of soda. The precipitate having subsided, is to be carefully washed with water, repeatedly poured on it, to carry off the small quantity of corrosive muriate that is formed. Calomel will thus be obtained. Berthollet has affirmed, however, that even as prepared from a solution of this kind, the precipitate retains in combination a portion of nitric acid. Mr. Phillips has also found, that, even when more mercury is used than the acid can dissolve, a large proportion of peroxide of mercury is formed, as is shown by adding an alkali, after the precipitation of the calomel, when the peroxide will be thrown down in considerable quantity. The process ought probably to be expunged from the Pharmacopœias, for it is not more economical than that by sublimation, and much less uniform in the product. The precipitated calomel is said to be more liable to occasion purging than that procured by sublimation, probably from the presence of a minute portion of the subnitrate.

OXIDUM HYDRARGYRI CINEREUM. Ash-coloured Oxide of Quicksilver. Ed.

"Take of Submuriate of Mercury, half an ounce; Solution of Lime, five pounds. Boil the submuriate in the solution in a vessel lightly closed, for a quarter of an hour; after the precipitate has subsided, pour off the liquor, wash the oxide with distilled water, and then dry it."

HYDRARGYRI OXYDUM CINEREUM. Grey or Ash-coloured Oxyde of Quicksilver. Lond.

"Take of Submuriate of Quicksilver, an ounce; of Liquor of Lime, a gallon. Boil the submuriate of mercury in the liquor of lime, stirring it constantly until the ash-coloured oxide of mercury fall down. Wash this with distilled water, and dry it."

Hydrargyri oxidum nigrum. Black Oxide of Mercury. Dub.

"Take of Sublimed Calomel, one part; Water of Caustic Potash made warm, four parts. Rub them together until an oxide of a black colour be obtained. Wash this repeatedly with water, and, lastly, dry it with a moderate heat upon bibulous paper."

These processes are intended to afford the protoxide of mercury in a pure state. That of the Dublin College, which was first proposed by Mr. Phillips, is the preferable one, the potash being more energetic than lime, and more completely decomposing the calomel. The reaction may be conceived to be, that the chlorine of the calomel, combining with the hydrogen of part of the water present, forms muriatic acid, which unites with the potash, while the mercury, uniting with the oxygen of the water, becomes protoxide of mercury, which is precipitated in the form of a black powder.

| | | | |
|---|---|---|---|
| 236 Chloride of Mercury | Mercury | 200 | 208 Protoxide of Mercury. |
| | Chlorine | 36 | |
| 9 Water | Oxygen | 8 | |
| | Hydrogen | 1 | |
| 48 Potash . . . . . . | | 48 | 85 Muriate of Potash. |

When lime instead of potash is used, there always remains a portion of calomel intermixed with the precipitated oxide. The Dublin process is not liable to this objection, but it is found extremely difficult to prevent the protoxide obtained from suffering decomposition, one portion yielding oxygen to the other, whence peroxide and metallic mercury are produced. To avoid this decomposition, the oxide should not be dried by heat, but allowed to dry of itself in a dark place. Yet with every precaution, an intermixture of peroxide so frequently happens, that the preparation cannot be trusted to as a mild mercurial.

Oxidum hydrargyri rubrum per acidum nitricum. Red Oxide of Quicksilver by Nitric Acid. Ed.

"Take of Purified Quicksilver, three parts; Diluted Nitrous Acid, four parts. Dissolve the quicksilver, and evaporate the solution with a gentle fire to a white dry mass, which, being reduced to powder, is to be put into a glass cucurbit, a thick glass plate being put over its surface. Then a capital being adapted, and the vessel placed in sand, apply to it a fire gradually raised, until it pass into very red small scales."

Hydrargyri nitrico-oxidum. Nitric Oxide of Quicksilver. Lond.

"Take of Purified Quicksilver by weight, three pounds; Nitric Acid by weight, a pound and a half; Distilled Water, two pints. Mix them in a glass vessel, and boil until the quicksilver is dissolved, and the water being evaporated, a white matter remains. Rub this into powder, and put into another vessel as shallow as possible; then apply a gentle heat, and gradually increase it, until any red vapour cease to be produced."

Hydrargyri oxydum nitricum. Nitric Oxide of Quicksilver. Dub.

"Take of Purified Quicksilver, two parts; Diluted Nitric Acid, three parts. Mix them in a glass vessel, and with a heat gradually

raised, dissolve the quicksilver; then raise the fire, until the residual matter in the bottom of the vessel pass into red scales."

The quicksilver is in this preparation first oxidated by the nitrous acid, and the peroxide formed then combines with the remaining acid. By the increase of heat, this nitrate is decomposed, and the greater part of the acid expelled, leaving a mass of a deep red colour. From the name of oxide given to this preparation, it appears to be supposed, that the whole acid of the nitrate is expelled or decomposed, and that the residual matter is quicksilver combined with oxygen alone. It is suspected, however, that there remains always in it a small proportion of nitric acid; hence the name of Hydrargyri subnitras ruber would be more proper, and would prevent its being mistaken for the true peroxide, (Hydrarg. oxid. rubr.) an error which has produced serious consequences in several instances.

It has always been found difficult to conduct this process, so as to obtain the product of that bright red colour and scaly appearance which are regarded as tests of its proper preparation; and some of the steps in the operation, as directed by the Colleges, are designed to attain this more perfectly. Much of the success depends apparently on the scale on which it is formed, the heat acting more steadily, and with more uniformity, on a large than on a small quantity. Dr. Barker recommends, that the vessel in which the preparation is made be not changed during the process. When properly prepared, it is in scales of a bright red colour. It is so acrid as to be altogether unfit for internal administration. Externally it is employed as an escharotic, being applied either in a finely levigated powder, or mixed with lard in the form of ointment.

Subsulphas hydrargyri flavus. Yellow Sulphate of Quicksilver Ed.

"Take of Purified Quicksilver, two parts; Sulphuric Acid, three parts. Put them into a glass cucurbit, and boil in a sand-bath to dryness. The white matter remaining at the bottom of the vessel being reduced to powder, is to be thrown into boiling water. The yellow powder thus produced is to be frequently washed with warm water."

Hydrargyri oxidum sulphuricum. Sulphuric Oxide of Quicksilver. Dub.

"Take of Persulphate of Quicksilver, one part; Warm Water, twenty parts. Rub them together in an earthen mortar, and pour off the supernatant liquor. Wash the yellow powder repeatedly with warm distilled water, as long as the decanted fluid gives any precipitate on the addition of a few drops of water of caustic potash; lastly, dry it."

It has been already stated, (p. 484,) that when sulphuric acid is boiled on mercury, a part of the acid is resolved into sulphurous acid, which escapes, and oxygen, which uniting with the mercury, forms peroxide of mercury; this unites with the rest of the sulphuric acid, and bipersulphate of mercury is the product. On this, in the present process, boiling water is poured; and it acts as water does on many of the metallic salts. Having a stronger affinity to their acid than to their base, it decomposes the salt, abstracting the acid,

and precipitating the peroxide; but the influence of quantity on chemical affinity still so far operates in this decomposition, that the acid in combining with the water retains a portion of the oxide combined with it, and the oxide precipitated retains a portion of the acid. The entire compound, therefore, is resolved into a supersalt, which is dissolved, and a subsalt, which is thrown down: or in the present case, the water poured on the persulphate of mercury abstracts the acid, retaining in combination with it a small portion of peroxide, while a subsulphate is precipitated, and forms the yellow powder. The color of this is more lively when hot water is used in its preparation, probably from the temperature favouring the chemical action of the water. The success of the process, with regard to the quantity of product, depends much on the sulphate of mercury having been deprived of all free acid previous to the affusion of the water; for if it contain much acid, the greater part of the salt is dissolved without being decomposed. The proportion of acid ordered in the Pharmacopœia is unnecessarily large, and rather defeats the object of the process; an equal weight is sufficient, and the heat ought to be applied to the saline mass until it is perfectly dry. The supersulphate which is dissolved in the water may be decomposed by potash, and a subsulphate precipitated.

The composition of yellow subsulphate of mercury has only of late been ascertained by Mr. Phillips. He states it to consist of three atoms of sulphuric acid, 120, and four atoms of peroxide of mercury, 864,=984; or it may be regarded as a compound of one equivalent of dipersulphate, 472, with two equivalents of persulphate of mercury, 512,=984. Or if we suppose the water to abstract from the bipersulphate an equivalent and a fourth of the acid, the present preparation will result. As a medicine it is sometimes used as an errhine, mixed with powder of liquorice root, in some affections of the eyes. Taken internally, it acts violently as an emetic in a dose of five grains, and its nauseating effect seems to promote absorption, whence it is sometimes useful in discussing swelled testicle. It has sometimes produced salivation. On account of the harshness of its operation, it is seldom used.

Sulphuretum hydrargyri nigrum. Black Sulphuret of Quicksilver. Ed. Dub.

"Take of Purified Quicksilver, Sublimed Sulphur, of each equal weights. Rub them together in a glass mortar with a glass pestle, (in an earthen mortar, Dub.) until the globules of quicksilver entirely disappear.

"It may be made likewise with a double proportion of quicksilver."

Hydrargyri sulphuretum nigrum. Black Sulphuret of Quicksilver. Lond.

"Take of Purified Quicksilver by weight, a pound; Sublimed Sulphur, a pound. Rub them together until the globules no longer appear."

By the trituration a chemical composition appears to be effected between the quicksilver and sulphur, as the former loses completely its metallic form, and no globules can be perceived in the powder

by the microscope. The product is a dark mass, named Ethiops mineral. It was at one time supposed to contain oxygen, but Mr. Brande has shewn that it consists of bisulphuret of mercury mixed with sulphur. It is almost inert.

Hydrargyrum cum magnesia. Quicksilver with Magnesia. Dub.

"Take of Quicksilver, Manna, each two parts; Carbonate of Magnesia, one part. Triturate the quicksilver with the manna in an earthen mortar, adding a few drops of water to give to the mixture the consistence of syrup, and continuing the trituration until the mercurial globules entirely disappear. Then add to the mixture a drachm of the magnesia, triturating it constantly. The whole being well mixed together, add a pint of hot water, and shake the mixture; allow the liquor to rest, and as soon as the sediment subsides, pour it off. Repeat this washing a second and third time, that the manna may be entirely removed; and, while the sediment is still humid, add to it the remaining magnesia. Lastly, dry the powder on bibulous paper."

Hydrargyrum cum creta. Quicksilver with Chalk. Lond.

"Take of Purified Quicksilver by weight, three ounces; Prepared Chalk, five ounces. Rub them together until the globules no longer appear."

Hydrargyrum cum creta. Quicksilver with Chalk. Dub.

"Prepare this in the same manner as Quicksilver with Magnesia, substituting only Precipitated Carbonate of Lime for Magnesia."

Quicksilver, when triturated with any substance which aids the division of its globules, and extends their surface, loses the metallic appearance, and becomes a dark grey powder, which is probably the protoxide, though by some it is doubted if the mercury be at all oxidated. The use of the manna in one of the processes is to facilitate the division, and supposed oxidation of the mercury, and it is afterwards removed by washing. The preparations are of use only to give to children as mild alteratives, the common mercurial pill being in all other cases preferable. The Hydrargyrum cum Magnesia is slightly laxative, the other absorbent and antacid. It is chiefly in tabes and tendency to hydrocephalus that they are given.

Hydrargyri oxydum rubrum. Red Oxide of Quicksilver. Lond. Dub.

"Take of Purified Quicksilver by weight, one pound, (any quantity, Dub.) Put the quicksilver into a long glass vessel, with a narrow mouth, and broad at the bottom. Apply heat to this open vessel, raised to the six-hundredth degree, until the quicksilver pass into red scales: then rub these into a fine powder."

At the temperature at which quicksilver boils, it combines with oxygen; and when heated to this temperature, under exposure to the air, red scales form on its surface from this combination, and it is gradually converted into peroxide. There is a difficulty, however, in conducting the process; for if the quicksilver be freely exposed to the air, a considerable quantity of it is lost, from its vapour being dissipated, especially if the heat be raised a little too high;

while, on the other hand, if the air is not freely admitted, the oxidation cannot proceed. The method directed in the formula of the Colleges is the most effectual,—employing a glass vessel broad at the bottom, (so as to present the quicksilver under an extensive surface,) and with a long neck, drawn out to a small aperture, so that while the atmospheric air is admitted, the mercurial vapour shall not easily escape, the heat being applied by the medium of sand. Still the oxidation goes on very slowly, requiring the application of the heat for several weeks; and from the necessity of keeping up a steady heat without allowing it to become too strong, the conducting of the process requires considerable attention, and the preparation is comparatively high priced.

Red oxide of quicksilver is in scales of a brick red colour. It consists of one atom of mercury, 200, and two atoms of oxygen, 16, =216. It is seldom given internally, being so acrid as to produce considerable irritation in the stomach or intestines. It is sometimes used as a stimulant application to sores, but the subnitrate, as cheaper, is commonly preferred.

HYDRARGYRUM PRÆCIPITATUM ALBUM. White Precipitate of Quicksilver. Lond.

"Take of Oxymuriate of Quicksilver, half a pound; Muriate of Ammonia, four ounces; Liquor of Subcarbonate of Potash, half a pint; Distilled Water, four pints. First dissolve the muriate of ammonia, then the oxymuriate of mercury in the distilled water, and add to these the liquor of subcarbonate of potash; wash the powder which is precipitated until it is free from taste, then dry it."

HYDRARGYRI SUBMURIAS AMMONIATUM. Ammoniated Submuriate of Quicksilver. Dub.

"To the liquor which has been poured off from the precipitated submuriate of mercury, add as much water of ammonia as is sufficient to precipitate the metallic salt. Wash the precipitate with cold distilled water, and dry it on bibulous paper."

THOUGH these two processes are apparently very different, they afford the same product, a submuriate of ammonia and peroxide of mercury. In the first, the potash attracts the greater part of the acid both of the muriate of mercury and muriate of ammonia, and the peroxide of mercury is precipitated, retaining a portion of the acid combined with it, and having attracted the quantity of ammonia necessary to the constitution of the triple compound. The other process, that in the Dublin Pharmacopœia, is simply the decomposition of corrosive muriate of mercury by ammonia. In the preparation of calomel by precipitation, it has already been stated, (p. 489,) that pernitrate of mercury is formed when the process is conducted with the application of heat; on adding muriate of soda to decompose the solution, a portion of corrosive sublimate is therefore formed; if to this ammonia is added, the triple compound of submuriate of ammonia and mercury is thrown down. The name given to this preparation by the Dublin College is preferable to that in the London Pharmacopœia, which is altogether vague. Submurias Hydrargyri et Ammoniæ is the correct appellation. It consists, ac-

cording to Mr. Hennel, of one equivalent of peroxide of mercury, one of muriatic acid, and one equivalent of ammonia.

This precipitate, when dried, forms a light white powder. It is used only externally, under the form of ointment in some cutaneous affections, and is recommended principally by its white colour.

HYDRARGYRI SULPHURETUM RUBRUM. Red Sulphuret of Quicksilver. Lond.

"Take of Purified Quicksilver by weight, forty ounces; Sublimed Sulphur, eight ounces. To the sulphur melted over the fire add the quicksilver, and as soon as the mass swells, remove the vessel from the fire, and cover it closely, that inflammation may not take place; then rub it into powder, and sublime."

SULPHURETUM HYDRARGYRI RUBRUM. Red Sulphuret of Quicksilver. Dub.

"Take of Purified Quicksilver, nineteen parts; Sublimed Sulphur, three ounces. Mix the quicksilver with the sulphur, melted, and if the mixture inflame, extinguish the flame by covering the vessel; then let the matter rubbed to powder be sublimed."

THE inflammation which is taken notice of, as liable to happen when the melted sulphur and quicksilver are mingled together, is not a combustion from oxygenation, but the evolution of heat and light from their mutual action; this taking place in other cases of the combination of sulphur with metals, and being wholly unconnected with any agency of the air. The covering of the vessel will therefore not check it, but prevents the sulphur suffering a real combustion, by which a little sulphate of mercury is sometimes produced. The temperature must be raised to redness to complete the sublimation of the cinnabar. It is procured in the form of a heavy crystalline mass, with much lustre, and, when reduced to powder, of a vivid red colour. It is a bisulphuret of mercury, composed of one atom of mercury, 200, and two atoms of sulphur, 16, = 216.

The principal medicinal application of Cinnabar is for mercurial fumigation. It is easily volatilized by heat, and its vapour, directed on the surface of venereal ulcers, checks the progress of the ulceration; and where it is of importance to do so speedily, as, from the situation of an ulcer it sometimes is, the practice is employed, a little of the powder being laid on a hot iron, and the vapour directed on the part. When applied, however, in this manner, to an ulcer in the throat, which is the most common application of mercurial fumigation, its sulphureous vapour proves irritating, and hence the grey oxide is sometimes preferred. The salivation produced by fumigation is often followed by great debility.

HYDRARGYRI CYANURETUM. Cyanuret of Mercury. Dub.

"Take of Cyanuret of Iron, six parts; Nitric Oxide of Mercury, five parts; Distilled Water, forty parts. Mix the cyanuret of iron with the oxide of iron, and add them to the water warmed. Boil the mixture for half an hour, with continual stirring, and strain through bibulous paper. Wash the residuum repeatedly with warm distilled

water. Lastly, evaporate the filtered solution, that on cooling crystals may form."

THE object of this process is to form cyanuret (rather bicyanide) of mercury, from which prussic acid may be prepared according to the formula, p. 419. The materials employed are peroxide of mercury, and the substance named Prussian blue. The latter, which is incorrectly termed Cyanuret of Iron by the Dublin College, appears to be a compound of prussic acid with protoxide and peroxide of iron,—a ferro-prussiate of iron. When it is boiled with peroxide of mercury, the prussic acid in it is decomposed, its hydrogen and the oxygen of the peroxide unite, and form water, and its cyanogen combining with the metallic mercury forms the cyanuret of mercury. The proportions of materials must be such as to furnish two equivalents of prussic acid to one of peroxide of mercury; the reaction is then such as is exhibited in the following diagram:

| | | |
|---|---|---|
| 54 Prussic Acid, (2 equiv.) | Hydrogen 1 | 9 Water. |
| | Hydrogen 1 | 9 Water. |
| | Cyanogen 26 | |
| | Cyanogen 26 | |
| 216 Peroxide of Mercury | Oxygen .. 8 | |
| | Oxygen .. 8 | |
| | Mercury 200 | 252 Bicyanide of Mercury. |

Prussian blue being variable in its composition, Dr. Barker recommends, that the peroxide of mercury be added to it, diffused in the boiling water, till the blue colour disappears. A portion of argil is present in Prussian blue, and a little nitric acid adheres to the nitric oxide, but the crystallization of the bicyanide separates it from these impurities.

The crystals of cyanuret of mercury are four-sided prisms; they are white, permanent in the air, and very soluble in water: they are used only in the preparation of prussic acid.

## PLUMBUM—LEAD.

ACETAS PLUMBI, *olim Saccharum Saturni*. Acetate of Lead, formerly Sugar of Lead. Ed.

"Take of White Oxide of Lead, any quantity; Distilled Acetic Acid, as much as may be necessary. Pour over the oxide in a cucurbit ten times its weight of Acid. Let the mixture stand on warm sand until the acid become sweet; pour it off, and add a fresh quantity successively, until it cease to acquire sweetness. Then evaporate the whole liquor, freed from impurities, in a glass vessel, to the consistence of thin honey, and put it aside in a cool place, that crystals may form, which are to be dried in the shade. Evaporate the remaining liquor, that there may be a new formation of crystals, and repeat this until no more are formed."

PLUMBI ACETAS. Acetate of Lead. Lond.

"Take of Subcarbonate of Lead, a pound; Strong Acetic Acid, a pint; Boiling Distilled Water, a pint and a half. Mix the acid with the water: to these add gradually the subcarbonate of lead, and

boil until the acid is saturated; then strain through paper, and having evaporated the water until a pellicle appear at the surface, put it aside that crystals may be formed. Having poured off the water, dry them on bibulous paper."

PLUMBI ACETAS. Acetate of Lead. Dub.

"Take of the Carbonate of Lead, Cerusse as it is named, any required quantity; Distilled Vinegar, ten times its weight. Digest in a glass vessel until the vinegar become sweet, which being poured off, add more until it cease to acquire sweetness. Strain the liquor, and by alternate slow evaporation and cooling form crystals which dry in the shade."

THIS process is not attempted in the shops, but is conducted on a large scale, to furnish the salt for the purposes to which it is applied in the arts. Distilled vinegar is either boiled on cerusse until the acid is saturated; or a more economical method is, to dissolve the oxide immediately after it is formed; plates of lead are moistened with vinegar, or partially immersed in it, until they are incrusted with oxide, and this oxide is then dissolved by immersing the plates altogether in the liquor; a new quantity of oxide is then formed by raising them again to the surface. This is continued until the acid is saturated, and then the liquor is brought by evaporation to crystallize.

It is obvious, that the acetic acid of the distilled vinegar combines with the oxide of lead. The salt which crystallizes was formerly supposed to be a superacetate; but it is the neutral acetate, composed of one equivalent of acetic acid, 51, one of protoxide of lead, 112, and three of water, 27,=190.

Acetate of lead crystallizes in acicular prisms, and, as prepared on a large scale, is usually in the form of masses composed of these crystals aggregated; it is white, or of a light yellowish colour, with a silky lustre; it is rather efflorescent; it has a sweet taste, whence the name of Sugar of Lead, by which it has been known, this sweetness being accompanied with a degree of astringency. It is soluble in four parts of water at 60°; with spring water the solution is milky, from a partial decomposition of the salt, by the minute quantity of sulphates or muriates contained in the water; and even with distilled water the solution is not perfectly transparent, if a large quantity of the water be employed; the water, when its affinity to the acid is aided by its quantity, producing a slight partial decomposition. Acetate of lead is employed principally as an external application, (p. 163.)

LIQUOR PLUMBI SUBACETATIS. Liquor of Subacetate of Lead. Lond.

"Take of the Semi-vitrified Oxide of Lead, two pounds; Diluted Acetic Acid, one gallon. Mix them, and boil down to six pints, stirring constantly; then put aside, that the impurities may subside, and strain."

PLUMBI SUBACETATIS LIQUOR. Liquor of Subacetate of Lead. Dub.

"Take of Semi-vitrified Oxide of Lead, one part; Distilled Vine-

gar, twelve parts. Boil to eleven parts in a glass vessel, then let the liquor rest, and after the impurities have subsided, strain it."

This preparation was introduced by Goulard, a French surgeon, under the name of Extract of Lead, as possessed of peculiar powers, and from the confidence with which it was recommended was established in practice. It is a solution of an uncrystallizable subacetate of lead, containing only half (according to Berzelius one-third) of the quantity of acetic acid, which exists in the neutral salt just described. The quantity of oxide of lead ordered in the London formula is more than double what it ought to be; a considerable portion of it is left undissolved, and retains part of the solution mixed with it. The proportions given in the Dublin Pharmacopœia were assigned by Dr. Barker, from experiment, as the most economical. The solution, or Goulard's extract, as it is named, is of a brown colour. When prepared with pyroligneous acid it is colourless. When kept, it becomes lighter, and deposites a quantity of oxide. It is used as a discutient, being mixed with vinegar and water, and frequently applied under the form of cataplasm. It forms also an application to inflamed surfaces, generally under the form of the following preparation.

Liquor plumbi subacetatis dilutus. Dilute Liquor of Subacetate of Lead. Lond. Plumbi subacetatis liquor compositus. Compound Liquor of Subacetate of Lead. Dub.

"Take of Liquor of Subacetate of Lead, a fluid-drachm; Distilled Water, a pint; Proof-spirit, a fluid-drachm. Mix them.

This is what Goulard named absurdly Vegeto-Mineral Water, and which has been highly celebrated as an application in superficial inflammation. It is occasionally employed by surgeons, and some have thought it superior to a simple solution of acetate or subacetate of lead. The spirit is added to render the solution less liable to decomposition, and it is not in such quantity as to make it stimulating.

## ZINCUM—ZINC.

Carbonas zinci impurus præparatus. Prepared Impure Carbonate of Zinc. Ed.

"The Impure Carbonate of Zinc, roasted by those who prepare brass, is to be reduced to powder in an iron mortar, and levigated on a porphyry stone with a little water; it is then to be put into a large vessel, and water poured upon it, which, after being well shaken, is to be poured off loaded with fine powder. The minute powder that subsides from the water on rest is to be dried."

Calamina præparata. Prepared Calamine. Lond.

"Calcine Calamine; then rub it to powder; lastly, reduce it to a very fine powder in the manner directed for preparing chalk."

Zinci carbonas impurum præparatum. Prepared Impure Carbonate of Zinc. Dub.

"Reduce Calcined Impure Carbonate of Zinc to powder, and separate the finer particles in the manner ordered in the preparation of chalk."

Calamine is an ore of zinc, the composition of which is variable. Some varieties of it appear to consist of oxide of zinc, combined with siliceous earth; but the more common varieties are composed of the carbonate more or less pure. When calcined by a moderate heat it becomes friable, so as to be more easily reduced to powder; and as this calcination is performed in preparing it for converting copper into brass by cementation, it is ordered in the Edinburgh Pharmacopœia to be obtained in this state, and then to be reduced to a fine powder by levigation and washing, in the same manner as carbonate of lime. Considerable care requires to be taken in this levigation, as the powder is applied to purposes, where, if it were coarse, it would prove irritating. It is used as an application to superficial inflammation and excoriation, dusted on the part; and it forms the basis of the common cerate, to which it communicates consistence and tenacity.

Oxidum zinci impurum præparatum. Prepared Impure Oxide of Zinc. Ed.

"This Oxide of Zinc is prepared in the same manner as the Impure Carbonate of Zinc."

Tutia, as this oxide is named, is impure, from an admixture of argillaceous earth; it is the sublimate collected in the chimneys in which zinc is calcined, mixed with clay and water, and baked. It is used externally for the same purposes as calamine, and hence requires to be well levigated.

Oxidum zinci. Oxide of Zinc. Ed.

"Let a large crucible be placed in a furnace filled with burning fuel, in such a manner that it shall be somewhat inclined to its mouth; and when the bottom of the crucible is at a moderate red heat, throw in a piece of zinc, about the weight of one drachm. The zinc soon inflames, and is converted into white flocculi, which are to be removed, from time to time, from the surface of the metal, with an iron spatula, that the combustion may proceed more perfectly; and, when the inflammation ceases, remove the oxide of zinc from the crucible. Another piece of zinc being thrown in, the operation is to be renewed and repeated as often as may be necessary. Lastly, let the oxide of zinc be prepared in the same manner as Impure Carbonate of Zinc."

Zinci oxydum. Oxide of Zinc. Lond.

"Take of Sulphate of Zinc, a pound; Liquor of Ammonia, a pint, or as much as may be necessary; Distilled Water, a pint. Dissolve the sulphate of zinc in the distilled water, and add as much of the liquor of ammonia as may be sufficient to precipitate the whole of the oxide of zinc. Having poured off the liquor, wash the powder repeatedly with distilled water, and dry it on a sand-bath."

Oxydum zinci. Oxide of Zinc. Dub.

"Take of Zinc broken into small pieces, any quantity. Throw these at intervals into a crucible at a red heat, sufficiently deep, the mouth of which inclines a little towards the mouth of the furnace, placing over it at each time another crucible inverted, but covering

it loosely so that the air may not be excluded. Let the light and very white sublimed powder be preserved for use."

Zinc is the most inflammable of the proper metals. At the temperature of ignition, it attracts the oxygen of the atmospheric air, and burns vividly with a white and green light, producing an oxide in very light flocculi. Part of this oxide remains in the crucible, incrusting the fragments of zinc, part is carried off by the rapid current of air arising from the burning zinc, and hence the reason of the direction to cover the crucible, with another inverted, so that this may be obviated,—a direction, however, not easily complied with without impeding the burning. The oxide accumulates so rapidly, that it must be withdrawn with a spatula to allow the combustion to proceed. Particles of metallic zinc are intermingled with it, and hence the necessity of submitting it to levigation. It is difficult, however, to remove these unburnt metallic particles entirely. Hence the London College adopt another process, and procure the oxide of zinc by decomposing the sulphate of zinc by ammonia. It will thus be obtained purer, and in a state of much finer division. The only caution requisite is, not to add the ammonia in excess, as it may redissolve a portion of the precipitate. There would appear to be an error in the formula, as a pint of cold water cannot dissolve a pound of sulphate of zinc. Mr. Brande has proposed to read a gallon instead of a pint. Oxide of zinc is light, white, tasteless, and insoluble in water. In medicine it is employed principally as an antispasmodic in epilepsy and chorea; also in hooping cough. Its dose is from two to five grains twice a-day, and this is gradually increased. It also forms the basis of a healing cerate.

Sulphas zinci. Sulphate of Zinc. Ed.

"Take of Zinc cut into small pieces, three parts; Sulphuric Acid, five parts; Water, twenty parts. Mix them, and the effervescence being finished, digest for some time on warm sand; then strain the liquor, after being decanted, through paper; and, after due exhalation, put it aside that crystals may be formed."

Zinci sulphas. Sulphate of Zinc. Lond.

"Take of Zinc in small pieces, four ounces; Sulphuric Acid by weight, six ounces; Distilled Water, four pints. Mix them in a glass vessel, and the effervescence being over, strain the liquor through paper; then boil it until a pellicle form on the surface, and put it aside that crystals may form."

Zinci sulphas. Sulphate of Zinc. Dub.

"Take of Zinc in small pieces, thirteen parts; Sulphuric Acid, twenty parts; Water, one hundred and twenty parts. To the zinc put into a glass vessel, add gradually the acid previously diluted with the water; when the effervescence ceases, digest for a short time; then evaporate the strained liquor, and after due evaporation, put it aside, that crystals may form."

The sulphuric acid, in this process, by a resulting affinity, enables the zinc to decompose the water, attracting its oxygen, the hydrogen being disengaged with effervescence: the oxide of zinc combines

with the acid, forming the sulphate of zinc. These changes are represented in the following diagram:

| | | | |
|---|---|---|---|
| 9 Water | Hydrogen | 1 | 1 Hydrogen. |
| | Oxygen | 8 | |
| 34 Zync . . . . | | 34 | |
| 40 Sulphuric Acid . | | 40 | 82 Sulphate of Zinc. |

By evaporation the sulphate of zinc is obtained in acicular crystals, which contain seven equivalents of water. The process, however, is scarcely ever performed in the shops, the sulphate of zinc being prepared on a large scale, from certain varieties of the native sulphuret of the metal. These are roasted, and exposed to air and humidity; oxygen is absorbed, the zinc is oxidated, and the sulphur is converted into sulphuric acid; the sulphate of zinc is extracted by lixiviation; and its solution is evaporated so far, that on cooling, the salt concretes in a granular mass, forming the white vitriol of commerce. It usually contains a little sulphate of iron, and sometimes, it has been supposed, a portion of sulphate of copper and of lead. From the insolubility of the latter salt, it can scarcely be present; the sulphate of copper is seldom to be discovered, and the sulphate of iron is in small quantity, and cannot communicate any injurious quality. And as sulphate of zinc is principally employed externally, the neglect of this process, and the substitution of the common white vitriol, are of less importance.

SOLUTIO SULPHATIS ZINCI. Solution of Sulphate of Zinc. Ed.

"Take of Sulphate of Zinc, sixteen grains; Water, eight ounces; Diluted Sulphuric Acid, sixteen drops. Dissolve the sulphate of zinc in water; then the acid being added, strain through paper."

THIS solution is designed to be used as a collyrium in ophthalmia, the sulphuric acid dissolving any excess of oxide that may be present in the common sulphate of zinc, and coinciding with it in astringency. As an injection in gonorrhœa, the solution, without the acid, is preferable, as sufficiently astringent and less irritating, and perhaps is also preferable as a collyrium.

SOLUTIO ACETATIS ZINCI. Solution of Acetate of Zinc. Ed.

"Take of Sulphate of Zinc, one drachm; Acetate of Lead, four scruples; Distilled Water, twenty ounces. Dissolve the salts separately in ten ounces of water each; mix the solutions, and, after the liquor has settled, strain it."

SULPHATE of zinc and acetate of lead being the two astringent salts which usually form the basis of the astringent injection employed in gonorrhœa, they had frequently been conjoined in one formula, without the prescriber perhaps being always aware of the decomposition they suffer. The solution, however, was found to be astringent without proving irritating. The use of it led to the introduction of the present process, in which the proportions are properly adjusted. The two salts exchange their principles, the sulphuric acid of the sulphate of zinc combining with the oxide of lead of the acetate of lead, while the acetic acid unites with the oxide of zinc. The sulphate of lead,

being insoluble, is precipitated, and is removed by filtration ; the acetate of zinc remains dissolved. These changes may be represented as follows :

| | | | |
|---|---|---|---|
| 163 Acetate of Lead | Acetic Acid | 51 | 93 Acetate of Zinc. |
| | Protox. Lead | 112 | |
| 82 Sulphate of Zinc | Oxide of Zinc | 42 | |
| | Sulphuric A. | 40 | 152 Sulphate of Lead. |

The solution is used both as an injection in gonorrhœa, and a collyrium in ophthalmia.

ZINCI ACETATIS TINCTURA. Tincture of Acetate of Zinc. Dub.

"Take of Sulphate of Zinc, Acetate of Potash, of each one part. Triturate them together, and add of Rectified Spirit, sixteen parts. Macerate for a week, agitating the liquor frequently, and strain it through paper."

IN this process a similar decomposition takes place, and the spirit dissolves the acetate of zinc which results, while the sulphate of potash remains in a great measure undissolved. The solution is strongly impregnated with the metallic salt, and a collyrium or injection of the usual strength may be prepared extemporaneously, by adding a certain proportion of it to water, though it requires much larger dilution than is proportional to the quantity of acetate of zinc it contains, to reduce the stimulant operation of the spirit. The formula appears to have no advantage over the more direct and simple method given by the Edinburgh College.

### STANNUM—TIN.

PULVIS STANNI. Powder of Tin. Dub.

"Take of very pure Tin, any quantity. Having melted it in an iron mortar, agitate it as it cools, until it is reduced to powder, which, when cold, is to be passed through a sieve."

TIN, when heated near to its melting point, becomes brittle, so as to be easily reduced to fragments. When melted, therefore, if stirred or agitated as it becomes solid, this effect is obtained, and a granular powder is formed more easily than by any other method. Its powers as an anthelmintic have been already considered, (p. 289).

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# CHAP. XXIV.

## SULPHUREA—PREPARATIONS OF SULPHUR.

OLEUM SULPHURATUM. Sulphurated Oil. Ed.

"Take of Olive Oil, eight parts; Sublimed Sulphur, one part. Boil with a gentle fire, in a large iron pot, stirring constantly until they unite."

OLEUM SULPHURATUM. Sulphurated Oil. Lond.

"Take of Washed Sulphur, two ounces; Olive Oil, a pint. Add the sulphur gradually to the oil heated in a large iron vessel, and stir constantly with a spatula until they unite."

This process, though apparently simple, is attended with some difficulty, the oil being very liable to boil over, or its vapour to catch fire: the heat therefore requires to be applied with caution; a large vessel ought to be employed, and a cover for it should be at hand, to extinguish combustion if it commence. It is one too unnecessary; for although the composition has been recommended in catarrh, asthma, and phthisis, it has fallen into disuse, being acrid and offensive. When employed, it was given in a dose of from 10 to 30 drops. It has been used externally to clean foul ulcers.

Sulphur sublimatum lotum. Washed Sublimed Sulphur. Ed.

"Take of Sublimed Sulphur, one part; Water, four parts. Boil the Sulphur for a short time in the water; then pour off this water, and adding cold water, wash away all the acid; lastly, dry the sulphur."

Sulphur lotum. Washed Sulphur. Lond.

"Take of Sublimed Sulphur, a pound. Pour upon it boiling water, that the acid, if there is any, may be washed out, then dry."

Sulphur lotum. Washed Sublimed Sulphur. Dub.

"Let Warm Water be poured on Sublimed Sulphur, and let the washing be repeated as long as the water poured off has received any acidity, which may be known by the test of litmus. Dry the sulphur on bibulous paper."

The sublimation of sulphur is usually conducted on a large scale, and the vapours of the sulphur which first rise, receiving a little oxygen from the atmospheric air of the subliming vessel, or of the chamber in which they are condensed, a slight degree of acidity is liable to be acquired, which it is the object of this process to remove. Any acidity, however, is so slight, that it is scarcely perceptible in the sublimed sulphur of the shops; the process is therefore superfluous, and is never attended to. By the washing, the bright yellow colour of the sulphur is removed, and it acquires more of a greenish-grey tinge.

Sulphur præcipitatum. Precipitated Sulphur. Lond.

"Take of Sublimed Sulphur, one pound; Lime recently prepared, two pounds; Water, four gallons. Boil the sulphur and the lime together in the water; strain the liquor through paper, and drop into it muriatic acid, as much as may be sufficient to precipitate the sulphur. Lastly, pouring water on this frequently, wash it until it remain tasteless."

In the first stage of this process, in which sulphur and lime are boiled in water, the sulphur decomposes the water, one portion taking its oxygen and forming sulphuric and hyposulphuric acids, while the rest of the sulphur combines with the hydrogen, and being in excess, produces bisulphuretted hydrogen; these compounds unite with the lime, and there result hyposulphate and hydro-bisulphuret of lime. Muriatic acid is then added, which attracts the lime from the

last compound, forming muriate of lime, that remains in solution, and the bisulphuretted hydrogen suffering decomposition as it is liberated, its elements having only a weak affinity to each other, is resolved into sulphuretted hydrogen gas, which is evolved, and sulphur, which is precipitated. The changes in this part of the process are of the following nature :

| | | | |
|---|---|---|---|
| 37 Muriatic Acid | . . . . . . . | 37 | 65 Muriate of Lime. |
| 61 Hydro-bisulphuret of Lime | Lime . . | 28 | |
| | Hydrogen | 1 | |
| | Sulphur . . | 16 | 17 Sulphuret. Hydrogen. |
| | Sulphur . . | 16 | 16 Sulphur. |

The precipitated sulphur is collected and washed. Thus the process ends in merely recovering a part of the sulphur which was employed, and seems without object ; but the sulphur in the precipitation combines with a portion of water, whence it acquires a white colour, and is on this account preferred in making sulphur ointment. The process, as Dr. Duncan states, often fails, chiefly, he is of opinion, by the acid being added too hastily and in excess. The propriety of its being retained is doubtful, as the whiteness of the sulphur occasions no difference in its medicinal effects. The whiteness of the precipitated sulphur of the shops is usually increased by precipitating the solution of the sulphuretted hydrosulphuret of lime, not by muriatic, but by sulphuric acid, sulphate of lime being thus formed and thrown down, intimately mingled with the sulphur: it is thus rendered white, but impure.

Sulphuretum potassæ. Sulphuret of Potash. Ed.

"Take of Subcarbonate of Potash, two parts ; Sublimed Sulphur, one part. Having rubbed them together, put them into a large coated crucible ; and a cover being adapted to it, apply the fire to it cautiously, until they melt. The crucible, after it has cooled, being broken, remove the sulphuret, and preserve it in a phial well stopt."

Potassæ sulphuretum. Sulphuret of Potash. Lond.

"Take of Washed Sulphur, an ounce ; of Subcarbonate of Potash, two ounces. Rub them together, and put them into a close crucible upon the fire until they unite."

Potassæ sulphuretum. Sulphuret of Potash. Dub.

"Take of Carbonate of Potash, four parts ; Sublimed Sulphur, one part. Put them mixed together into a crucible, and, applying a cover, expose them to a fire gradually raised, until they unite. Keep the sulphuret in a well-closed vessel."

During the fusion of the two substances, it was supposed that the sulphur and potash combined, but the researches of Vauquelin rather lead to the conclusion that the potash is partially decomposed by the sulphur. One part of the potash, it would appear, yields its oxygen to part of the sulphur, which becomes sulphuric acid, and combines with the portion of potash which is not decomposed. The liberated potassium and the rest of the sulphur unite, and thus sulphuret of potassium, or rather, as there is an excess of sulphur, bisulphuret of potassium, and sulphate of potash, are produced. When this

compound is thrown into water, the water is decomposed by it ; the potassium attracts oxygen and becomes potash, and the sulphur combines with hydrogen, forming bisulphuretted hydrogen, which unites with the alkali, and a solution results of Hydro-bisulphuret of Potash. The dry compound is of a yellowish-green or brown colour, and inodorous ; but becomes fetid when moistened or dissolved in water, from the decomposition that happens. The Colleges employ carbonate of potash in the process as cheaper than pure potash, and the result is the same, the carbonic acid being expelled by the heat and the chemical action. Dr. Barker is of opinion, that the proportion of sulphur ordered by the Dublin College, which is half of the quantity prescribed by the other Colleges, is sufficient ; but as to this there may be some doubt. The preparation is so indefinite in its constitution, that it is difficult to say what proportions are most suitable ; but as it is the sulphur which, in a medicinal point of view, is the important ingredient, there should not be any risk of its being deficient. Sulphuret of potash has been proposed to be used as an antidote to some of the metallic poisons, from the supposition that the sulphur will combine with the metallic preparation, and render it inert, and has in some cases been found useful. From a similar theory, it has been imagined that it might obviate the effects of mercury on the system when these are too violent ; but it is seldom had recourse to with this intention, and it is doubtful if much advantage would be derived from it. The dose in which it is given internally, is from ten to twenty grains, three or four times a-day. It is said, in some cases of cancer, to have increased the efficacy of hemlock as a palliative, in doses of five grains. Externally, it has been recommended in tinea capitis ; a wash prepared from three drachms of it with an ounce of soap, dissolved in eight ounces of lime-water, with the addition of two drachms of ardent spirit, being applied to the scalp. A solution of it is also very beneficial in the cure of scabies.

Potassæ sulphureti aqua. Solution of Sulphuret of Potash. Dub.

"Take of Washed Sulphur, one part ; Water of Caustic Potash, eleven parts. Boil for ten minutes, and strain through paper. Keep the solution in well-closed vessels ; its sp. gr. is 1117."

This is a mixed solution of sulphate of potash and hydro-bisulphuret of potash in water, of the same nature as is formed by dissolving the sulphuret of potash. If the air be not carefully excluded, it is in time converted into sulphate of potash. It is used for the same purposes as the last preparation ; the dose is from three grains to a drachm given thrice a-day, diluted with water.

# CHAP. XXV.

## PULVERES—POWDERS.

This is the simplest form of composition of medicines, the different articles being merely reduced to powder, and mixed together. It is adapted to the exhibition of such remedies as are not ungrateful, and such as are not liable to lose their virtues by keeping; and is usually an improper form for those which are bitter, acrid, or fetid, which require to be given in a large dose, or which are not easily diffused in water, the vehicle in which powders are usually taken. The dose of a powder seldom exceeds a drachm; and if it require to be given only in a few grains, it is better that it should be under the form of bolus. When it is to be taken, it is merely diffused in water, wine, or any other convenient vehicle; for heavy powders, viscid fluids, as syrups or conserves, are preferable. The Dublin College gives the following general directions for the preparations of powders:—

"Those substances which are to be reduced to powders, after being first dried, are to be pulverised in an iron mortar. The powder is then to be shaken through a hair-sieve, and is to be preserved in close vessels."

In reducing vegetable substances to powder, there is always a degree of loss, partly owing to the escape of hygrometric moisture, or of some volatile principle, partly from the dispersion of some of the finer particles in the air; there is often, also, a portion of woody matter, which, as being tough and inert, is rejected. The amount of this loss varies, according to M. Henry, from 3 to 10 or 15 parts, from 100 of different vegetables. If it arise from the dissipation of moisture, or the abstraction of woody matter, the powder will still have all the power of the original quantity, and in a better form.

Pulvis aromaticus. Aromatic Powder. Ed.

"Take of Bark of Cinnamon, Cardamom Seeds, Ginger Root, of each equal parts. Rub them into a very fine powder, which is to be kept in a glass phial well stopt."

Pulvis cinnamomi compositus. Compound Powder of Cinnamon. Lond.

"Take of Bark of Cinnamon, two ounces; Cardamom Seeds, an ounce and a half; Ginger, an ounce; Long Pepper, half an ounce. Rub them together so as to form a fine powder."

Pulvis aromaticus. Aromatic Powder. Dub.

"Take of Cinnamon, two ounces; Lesser Cardamom Seeds, freed from the capsules, Ginger, of each one ounce; Long Pepper, one drachm. Rub them together to a powder."

This combination of aromatics is designed to communicate to other compositions fragrance and pungency, and to obviate the nausea which ungrateful medicines are liable to excite. The quantity added to a dose is generally about five grains.

Pulvis asari compositus. Compound Powder of Asarabacca. Ed.

"Take of the Leaves of Asarabacca, three parts; the Leaves of Marjoram, Flowers of Lavender, of each one part. Rub them together to a powder."

Pulvis asari compositus. Compound Powder of Asarabacca. Dub.

"Take of the Leaves of Asarabacca dried, an ounce; Flowers of Lavender dried, one drachm. Rub them together, and form a powder."

This is a mild errhine, forming the composition known by the name of Herb Snuff. When snuffed in the quantity of a few grains, it occasions sneezing and a discharge of mucus, and is sometimes very useful in headach and ophthalmia. It is said to have cured paralysis of the mouth and tongue.

Pulvis carbonatis calcis compositus. Compound Powder of Carbonate of Lime. Ed.

"Take of Prepared Carbonate of Lime, four ounces; Bark of Cinnamon, one drachm and a half; Nutmeg, half a drachm. Rub them together to powder."

This is designed to be used as a grateful antacid. It is given in the dose of one drachm.

Pulvis cretæ compositus. Compound Powder of Chalk. Lond. Dub.

"Take of Prepared Chalk, half a pound; Bark of Cinnamon, four ounces; Tormentil Root, Gum-Arabic, of each three ounces; Long Pepper, half an ounce. Reduce them separately to powder, and mix them."

In this composition, though analogous to the preceding one, the proportion of the aromatics is larger, and the addition of the tormentil root renders it more astringent. It is used to relieve diarrhœa arising from acidity, being given in the dose of half a drachm or a drachm.

Pulvis cretæ compositus cum opio. Compound Powder of Chalk with Opium. Lond. Dub.

"Take of Compound Powder of Chalk, six ounces and a half; Hard Opium, rubbed to powder, four scruples. Mix them."

The addition of opium to astringents and antacids, when given in diarrhœa, is a common practice, and this formula affords a convenient composition of this kind. Its dose is one scruple, or half a drachm. Two scruples contain one grain of opium.

Pulvis jalapæ compositus. Compound Powder of Jalap. Ed. Dub.

"Take of the Powder of the Root of Jalap, one part, (half a pound, Dub.); Supertartrate of Potash, two parts, (one pound, Dub.) Rub them together into a very fine powder."

This combination affords an excellent purgative, less stimulating, and less liable to excite griping than jalap alone. It is given in the dose of a drachm; and in dropsy, as a hydragogue cathartic, to the extent of two drachms. The supertartrate is added partly with the

intention of modifying the effect, and partly to render the division of the jalap more complete.

Pulvis ipecacuanhæ et opii. Powder of Ipecacuanha and Opium. Ed.

"Take of the Powder of the Root of Ipecacuanha, Opium, of each one part; Sulphate of Potash, eight parts. Rub them together into a fine powder."

Pulvis ipecacuanhæ compositus. Compound Powder of Ipecacuanha. Lond. Dub.

"Take of Root of Ipecacuanha in powder, Hard Opium, (Turkey Opium, Dub.) in powder, of each a drachm; Sulphate of Potash, one ounce. Mix them. Rub the sulphate of potash with the opium into powder, then mix in the ipecacuanha."

This composition, Dover's powder, has long been established in practice, and is one of those useful combinations which experience, or rather accident, discovers, the powers of which could not have been inferred *a priori* from the known operation of its ingredients. It affords one of the best examples of the power which one medicine has of modifying the action of another, the ipecacuan rendering the operation of the opium, as a sudorific, more certain than it otherwise would be, and appearing also to diminish its narcotic effect, so that the composition can be given with safety in inflammatory affections, in which opium alone would be hazardous. The sulphate of potash serves to divide the particles of the opium and ipecacuan, and mix them more intimately; and such is the advantage derived from it, that, as Dr. Blane has remarked, the opium and ipecacuan alone, mixed in the above proportions, have not the same effect. Hence, too, the operation of the powder is always more certain when it has been triturated to a great degree of fineness, and the directions in some of the Pharmacopœias are in this respect imperfect. This powder is the most powerful and certain sudorific we possess, (p. 234).

Pulvis opiatus. Opiate Powder. Ed.

"Take of Opium, one part; Prepared Carbonate of Lime, nine parts. Rub them together to a fine powder."

This is designed as a convenient form for administering opium. Ten grains contain a grain of opium, and form a medium dose. It is, however, little used.

Pulvis cornu usti cum opio. Powder of Burnt Hartshorn with Opium. Lond.

"Take of Hard Opium rubbed to powder, one drachm; Burnt and Prepared Hartshorn, an ounce; Cochineal in powder, a drachm. Mix them."

This, in a former edition of the Pharmacopœia, had the name of Pulvis Opiatus, which has been changed to its present appellation, as being less liable to be confounded with Powder of Opium. A little cochineal is added to give it colour. The burnt hartshorn divides the opium, and from its hardness and grittiness is better adapted to this than the chalk of the preceding preparation. One grain of opium is contained in ten of the powder.

Pulvis salinus compositus. Compound Saline Powder. Ed. Dub.

"Take of Pure Muriate of Soda, Sulphate of Magnesia, of each four parts; Sulphate of Potash, three parts. Rub the salts, previously dried by a gentle heat, separately to a fine powder, and then together. The powder should be kept in a vessel well corked."

This is a very pleasant cathartic, and very well adapted to those who are of a costive habit. The dose is a drachm taken in water, or any other convenient vehicle.

Pulvis scammoniæ compositus. Compound Powder of Scammony. Ed.

"Take of Scammony, Supertartrate of Potash, of each equal parts. Rub them together into a very fine powder."

Scammony alone is liable to act with violence, while its operation is at the same time somewhat uncertain. By the addition of the supertartrate of potash, its cathartic operation is rendered more certain and less irritating. It is also preferred to the scammony alone, as a hydragogue cathartic. Its dose is from ten to twenty grains.

Pulvis scammoniæ compositus. Compound Powder of Scammony. Lond. Dub.

"Take of Scammony Gum-resin, Hard Extract of Jalap, of each two ounces; Ginger, half an ounce. Rub them separately into a very fine powder, then mix them."

This composition, though under the same name as the preceding one, is of a very different nature; the stimulating operation of the scammony not being corrected, but rather increased by the addition of the extract of jalap. The ginger will communicate an aromatic pungency, and obviate griping. The compound is a strong cathartic. Its medium dose is ten grains.

Pulvis aluminis compositus. Compound Powder of Alum. Ed.

"Take of Alum, four parts; Kino, one part. Rub them together into a fine powder."

This being a combination of two powerful astringents, has been sometimes used internally in menorrhagia, in repeated doses of ten or fifteen grains, and externally as a styptic application to bleeding wounds. There is reason, however, to fear that the alum will be decomposed by the kino; but whether the astringent efficacy of the mixture will be much diminished in consequence, remains to be ascertained.

The following Powders have a place in the London or Dublin Pharmacopœia, without any preparations corresponding to them in the Edinburgh Pharmacopœia.

Pulvis aloes compositus. Compound Powder of Aloes. Lond. Dub.

"Take of Extract of Spiked Aloes, (Hepatic Aloes, Dub.) one ounce and a half; Guaiac, one ounce; Compound Powder of Cinnamon, half an ounce. Rub the aloes and guaiac separately into powder; then mix them with the compound powder of cinnamon."

This combination of aloes with guaiac is designed as a stimulating aperient, and may be given in a dose of fifteen or twenty grains. The form of powder is, however, ill adapted to the exhibition of a substance so bitter and nauseous as aloes, or of resinous substances, such as guaiac; and the composition is therefore little used.

Pulvis aloes cum canella. Powder of Aloes with Canella. Dub.

"Take of Hepatic Aloes, one pound; Canella Bark, three ounces. Rub them separately to powder; then mix them."

This had a place in a former edition of the London Pharmacopœia, but is now thrown out. The canella covers the unpleasant flavour of the aloes; and this combination is sometimes used as a warm stimulating cathartic, not under the form of powder, but made into a tincture, by infusing it in spirit. A composition of this kind, designed for this purpose, has long been kept in the shops, under the name of Hiera Picra.

Pulvis contrayervæ compositus. Compound Powder of Contrayerva. Lond.

"Take of Contrayerva Root rubbed to powder, five ounces; Prepared Oyster Shells, one pound and a half. Mix them."

This is a composition which has long kept its place in the Pharmacopœias, and has been often reformed. It is scarcely adapted to to any important purpose, or possessed of any advantage. It has been given as a tonic and stimulating diaphoretic in typhus, exanthemata and atonic gout, in a dose of half a drachm.

Pulvis cornu cervini usti. Powder of Burnt Hartshorn. Dub.

"Burn pieces of Hartshorn until they become white, then reduce them to a very fine powder."

Cornu ustum. Burnt Horn. Lond.

"Burn pieces of Horn in an open fire until they become perfectly white, then rub them to powder, and prepare them in the same manner that chalk is prepared."

The horns of the deer contain a large quantity of phosphate of lime, according to Guillot, 57 parts in 100 of horn, with but a small portion of other earthy matter, while bones contain less phosphate of lime, with a large proportion of other earthy salts. As the object of the present process is to obtain phosphate of lime, the Dublin College, with propriety, name hartshorn as the animal substance to be used. During the burning, the gelatin of the horn is decomposed; its carbonaceous matter partly remains, giving a black colour; but, by continuing the heat, this also is burnt out. The phosphate of lime, which is the product of the process, has been given in rickets and mollities ossium, there appearing to be in these diseases a deficient supply of this earthy salt to the bones. When administered in such cases, its dose is half a scruple, and it is mixed with phosphate of soda; benefit has been stated to be derived from it. It is used to reduce substances which are soft and tenacious, as opium, to powder, being rubbed along with them; and it is better adapted to this purpose than chalk, which is sometimes employed, as it is more gritty. Its powder is sometimes employed as a dentrifice.

Pulvis kino compositus. Compound Powder of Kino. Lond. Dub.

"Take of Kino, fifteen drachms; Cinnamon Bark, half an ounce; Hard Opium, a drachm. Triturate them separately into a very fine powder, then mix them."

Kino is one of the most powerful vegetable astringents. The cinnamon will communicate to it a grateful aromatic flavour and pungency, and the addition of the opium will render it a more powerful remedy in diarrhœa. It may be given in a dose from ten to twenty grains. The proportion of opium in it is one part in twenty.

Pulvis sennæ compositus. Compound Powder of Senna. Lond.

"Take of Leaves of Senna, Supertartrate of Potash, of each two ounces; Scammony Gum-Resin, half an ounce; Ginger Root, two drachms. Rub the scammony separately, the others together, into a fine powder, and mix them."

This may be employed as a purgative, in a dose of from half a drachm to a drachm. The senna is, however, so inferior in power to the scammony, that there appears to be little advantage in their combination, nor is the form of powder well adapted to their exhibition. Indeed, the object of adding scammony is to increase the cathartic power, as a dose of the senna in powder would require, to produce much effect, to be inconveniently bulky.

Pulvis scillæ. Powder of Squill. Dub.

"Let the roots of Squill, freed from their membranous integuments, and cut into transverse slices, be dried on a sieve with a gentle heat: then reduce them to powder, which must be kept in glass phials well closed with glass stoppers."

The layers of squill root being covered by a thin pink-coloured membrane, can be dried properly only by being cut into transverse slices, and exposed to a moderate heat in a stove. By the drying, the squill loses about four-fifths of its weight, and with little diminution of its powers, if too much heat has not been applied. It is in this state that it is commonly employed in medicine, and for other pharmaceutic preparations. It requires to be kept in a dry place, as otherwise it regains its softness, and is liable to become mouldy. Though the Dublin College order it to be reduced to powder, it is better to preserve the dried root without pounding it, as directed by the other Colleges, (p. 296, 297).

Pulvis spongiæ ustæ. Powder of Burnt Sponge. Dub. Lond.

"Cut Sponge in small pieces, and bruise it so as to free it from small stones, (extraneous bodies, Lond.); then burn it in a close iron vessel until it become black and friable; lastly, reduce it to a very fine powder."

Sponge contains a small portion of iodine, which gives to this powder medicinal activity. The burning is not carried so far as to destroy all the animal matter, lest the iodine should be volatilized. M. Chereau recommends that the sponge be only roasted. If it has been well prepared, the powder gives out purple fumes when

sulphuric acid is poured upon it, and the mixture heated in a glass tube. It consists chiefly of carbonaceous matter, with carbonate and muriate of soda and iodine in the state of hydriodate of soda. From the presence of this latter ingredient, it has been found to act as a deobstruent in bronchocele and scrofulous affections of the glands, given in the dose of one or two scruples made into an electuary with honey. But the preparations of iodine introduced by the Dublin College are preferable, as of uniform strength, and more easily administered.

The ashes of the Fucus Vesiculosus, or Bladder-wrack, have been applied to the same medicinal use as burnt sponge, and appear to contain also a small portion of iodine.

Pulvis tragacanthæ compositus. Compound Powder of Tragacanth. Lond.

"Take of Tragacanth, rubbed to powder, Gum-Arabic in powder, Starch, of each one ounce and a half; Refined Sugar, three ounces. Triturate the starch and sugar together into powder, then having added the tragacanth and the gum-arabic, mix them all together."

This combination of mucilaginous substances may be employed for the general purposes of demulcents, in the dose of a drachm, or two drachms, frequently repeated. But it appears to be a very superfluous composition. It is sometimes used as a glutinous vehicle for calomel, and other heavy insoluble powders.

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# CHAP. XXVI.

## ELECTUARIA—ELECTUARIES.

This term is applied to that form of compound medicines where the consistence is nearly that of thick honey. An electuary is composed, in general, of a powder reduced to the proper consistence by the addition of syrup or mucilage. It is a proper form for administering medicines which are not very disagreeable in their taste or flavour; and, except in a few officinal preparations, it is an extemporaneous prescription, as, when long kept, it is liable to become too thick and adhesive from the evaporation of part of its moisture, and the crystallization of the sugar. To avoid the latter inconvenience, it has sometimes been recommended to employ molasses, which are not crystallizable, or syrups from which the crystallizable parts have separated. Dry powders generally require twice their weight of syrup to bring them to the due consistence; and syrup is preferable to mucilage, as the electuary made with the former does not so soon become dry. An electuary in a day or two after being prepared generally becomes much thicker, from a more intimate combination of the substance employed with the syrup, and it is neces-

sary to add an additional portion of syrup. The common dose of an electuary rarely exceeds two tea-spoonfuls, and is seldom less than a tea-spoonful; any very active medicine, which requires to be given in a smaller dose, being usually administered under the form of bolus.

The London College have united the Electuaries with the Conserves, as they are both compositions of vegetable matter with sugar, and are of similar consistence; and have given to them the common name of Confections, (p. 299). The Edinburgh College retain the distinction of conserves, and the preparations which have this name have been already considered.

Electuarium aromaticum. Aromatic Electuary. Ed.

"Take of Aromatic Powder, one part; Syrup of Orange-Peel, two parts. Mix, beating them well together, so as to form an electuary."

Confectio aromatica. Aromatic Confection. Lond. Dub.

"Take of Cinnamon Bark, Nutmegs, each two ounces; Cloves, one ounce; Cardamom Seeds, half an ounce; Saffron, dried, two ounces; Prepared Oyster Shells, (Chalk, Dub.) sixteen ounces; Refined Sugar, in powder, two pounds; Water, a pint. Triturate the dry substances together into a fine powder, then add the water gradually, and mix them so as to form an uniform mass."

The composition of the Edinburgh Pharmacopœia is the most simple of these; in the others the carbonate of lime is foreign to the object of the combination, though, as it has long had a place, it is still retained. Either electuary is a grateful aromatic preparation, occasionally combined with other medicines, or made the basis of cordial carminative mixtures, requiring merely for this purpose to be diffused in water with a little syrup. The substitution by the Dublin College of prepared chalk instead of oyster-shells is proper, as the latter can scarcely be reduced to a powder sufficiently fine.

Electuarium cassiæ fistulæ. Electuary of Purging Cassia. Ed.

"Take of the Pulp of Cassia, four parts; Pulp of Tamarind, Manna, of each one part; Syrup of Pale Rose, four parts. Dissolve the manna, beat in a mortar, with a gentle heat, in the syrup; then add the pulps, and, by a continued heat, reduce the mixture to a proper consistence."

Confectio cassiæ. Confection of Cassia. Lond. Electuarium cassiæ. Dub.

"Take of Fresh Pulp of Cassia, half a pound; Manna, two ounces; Pulp of Tamarind, an ounce; Syrup of Rose, (of Orange-Peel, Dub.) half a pint. Bruise the manna, then dissolve it in the syrup by the heat of a water-bath, mix in the pulps, and evaporate to a proper consistence."

This electuary affords a mild laxative, which operates in the dose of an ounce. From the predominance of the pulps and the saccharine matter, it is liable, however, to become sour on keeping. It is also inferior in activity to the next electuary, which is equally

pleasant, and hence it is so little used that it is never found in the shops."

Electuarium catechu compositum. Compound Electuary of Catechu. Ed.

"Take of Extract of Catechu, four ounces; Kino, three ounces; Bark of Cinnamon, Nutmeg, of each one ounce; Opium diffused in a sufficient quantity of Spanish White Wine, one drachm and a half; Syrup of Red Rose, boiled to the consistence of honey, two pounds and a quarter. Reduce the solid ingredients to powder, and, mixing with them the opium and syrup, form an electuary."

Electuarium catechu compositum. Compound Electuary of Catechu. Dub.

"Take of Catechu, four ounces; Cinnamon, two ounces; Kino, three ounces. Rub them into powder; then add of Turkey Opium, a drachm and a half, diffused in Spanish White Wine; Syrup of Ginger boiled to the consistence of honey, two pounds and a quarter. Mix."

In this electuary, the more powerful vegetable astringents are combined; they are rendered more grateful by the addition of the aromatics, and the efficacy of the composition, as a remedy in diarrhœa, is increased by the opium. It is the basis of the common extemporaneous astringent mixture; two drachms of it being diffused with a little syrup in six ounces of water, and a table-spoonful of this being taken three or four times a-day. One grain of opium is contained in rather more than three drachms.

Electuarium opiatum, *olim Electuarium Thebaicum.* Opiate Electuary. Ed.

"Take of Aromatic Powder, six ounces; Virginian Snake-root, rubbed to a fine powder, three ounces; Opium, diffused in a sufficient quantity of Spanish White Wine, half an ounce; Syrup of Ginger, one pound. Mix, so as to form an electuary."

Confectio opii. Confection of Opium. Lond. Dub.

"Take of Hard Opium, rubbed to powder, six drachms; Long Pepper, an ounce; Ginger-root, two ounces; Caraway Seeds, three ounces; Tragacanth, in powder, two drachms; Syrup, a pint, (a pound, Dub.) Rub the opium with the syrup heated, then add the other ingredients ground to powder, and mix them."

This is a substitute for compositions once highly celebrated, and which have long kept their place in the Pharmacopœias of Europe, the Mithridate and Theriaca, which at one period consisted of above an hundred ingredients. Opium appeared, amid this farrago, to be the ingredient of predominating power, modified principally by aromatics; they have been, therefore, gradually reformed into the present preparation, and even it is scarcely used. A grain of opium is contained in forty grains of the Edinburgh preparation, in thirty-six of the London, and twenty-five grains of the Dublin confection.

Electuarium sennæ compositum. Electuary of Senna. Ed.

"Take of the Leaves of Senna, eight ounces; Coriander Seeds,

four ounces; Liquorice Root, bruised, three ounces; Figs, Pulps of Prunes, of each one pound; Pulp of Tamarind, half a pound; Refined Sugar, two pounds and a half; Water, four pounds. Bruise the senna with the coriander seeds, and separate by passing through a sieve ten ounces of the mixed powder. Boil the residuum with the figs and the liquorice in the water to one half; then express and strain. Reduce the strained liquor, by evaporation, to about a pound and a half. Afterwards add the sugar gradually. Add the pulps, and, lastly, mix in the powder."

Confectio sennæ. Confection of Senna. Lond.

"Take of Senna Leaves, eight ounces; Figs, a pound; Pulp of Tamarind, Pulp of Cassia, Pulp of Prune, of each half a pound; Coriander Seeds, four ounces; Liquorice Root, three ounces; Refined Sugar, two pounds and a half. Beat the senna leaves with the coriander seeds, and separate ten ounces of the mixed powder by a sieve. Boil the remainder with the figs and the liquorice root in four pints of water to one-half; then express and strain. Evaporate the strained liquor in a water-bath until only a pint and a half remain, then adding to it the sugar, form a syrup. Lastly, rub the pulps with the syrup, and sprinkling in the powder passed through the sieve, mix the whole together."

Electuarium sennæ. Electuary of Senna. Dub.

"Take of Senna Leaves in fine powder, four ounces; Pulp of Prunes, a pound; Pulp of Tamarinds, two ounces; Treacle, a pint and a half; Essential Oil of Caraway, two drachms. Boil down the pulps in the treacle to the consistence of honey; then add the powder, and, when the mixture cools, the oil; lastly, mix them all well together."

This electuary is in common use as a mild purgative. Its dose is from two to four drachms; and it is sometimes rendered more active by the addition of a little jalap, or supertartrate of potash. From the number of the ingredients, which render it expensive, the London Confection is generally, according to Mr. Phillips, ill prepared, the cassia and senna being often omitted. The electuary of the Dublin Pharmacopœia is more simple than the others, and is, on the whole, preferable, though the oil of caraway will perhaps communicate rather too much pungency to a medicine in this form.

Confectio amygdalarum. Confection of Almonds. Lond. Dub.

"Take of Sweet Almonds, an ounce; Gum-Arabic, in powder, a drachm; Refined Sugar, half an ounce. The almonds having been previously macerated in water, and their external pellicle removed, beat the whole together, until they form an uniform mass."

This is introduced as affording an easy and convenient mode of preparing the almond emulsion extemporaneously; a little of this confection forming it by diffusion in water.

Confectio rutæ. Confection of Rue. Lond. Dub.

"Take of the Dried Leaves of Rue, Caraway Seeds, Laurel Berries, of each an ounce and a half; Sagapenum, half an ounce; Black Pepper, two drachms; Clarified Honey, sixteen ounces. Tri-

turate the dry ingredients into a fine powder; then adding the honey, mix them together."

This is intended as the basis of an enema, sometimes given in the hysteric paroxysm, and in flatulent colic.

Confectio scammoniæ. Confection of Scammony. Lond. Electuarium scammoniæ. Dub.

"Take of Scammony powder, an ounce and a half; Cloves bruised, Ginger Root in powder, of each six drachms; Oil of Caraway, half a fluid-drachm; Syrup of Rose, as much as may be necessary. Triturate the dry substances into a very fine powder; then having added the syrup, rub them again: and, adding the oil of caraway, mix them together."

This is a stimulating cathartic, not very frequently employed. Its dose is from half a drachm to a drachm.

Confectio piperis nigri. Confection of Black Pepper. Lond. Dub.

"Take of Black Pepper, Elecampane Root, of each a pound; Fennel Seeds, three pounds; Honey, Refined Sugar, of each two pounds. Rub the dry materials together into a very fine powder; then having added the honey, rub them till they form an uniform mass."

This preparation has been introduced into the Pharmacopœias, as resembling Ward's Paste for the Piles. It has been found of much utility in cases attended with debility, and constitutional sluggishness; its chief action is to stimulate the secretory surface of the rectum. In plethoric and feverish habits it is injurious.

Enema catharticum. Cathartic Clyster. Dub.

"Take of Manna, an ounce. Dissolve it in ten ounces by measure of Compound Decoction of Chamomile, and add of Olive Oil, an ounce; Sulphate of Magnesia, half an ounce. Mix them."

Enema fœtidum. Fetid Clyster.

"Is made by adding to the Cathartic Clyster two drachms of Tincture of Assafœtida."

Enema opii. Opiate Clyster.

"Take of Tincture of Opium, a drachm; Warm Water, six ounces. Mix."

Enema terebinthinæ. Turpentine Clyster.

"Take of Common Turpentine, half an ounce; the Yolk of one Egg. Rub them together, and add gradually ten ounces of water, of a temperature not exceeding 100°."

The Dublin College have introduced among their extemporaneous preparations these forms of clysters. This kind of remedy is in general too much neglected, considering the advantage with which it is often attended. It affords the best means of obviating habitual costiveness, restoring the healthy action of the intestines, which the use of purgatives often fails to effect, while they debilitate or irritate the stomach: And where, in disease, the intestinal canal has become torpid, the action of an enema frequently produces a degree of relief

and abatement of the symptoms, greater than could at all have been anticipated. By varying the nature of the enema, an anodyne, astringent, laxative or emollient effect can be induced, without subjecting the stomach and smaller intestines to the action of medicines, that, to be equally effectual, might require to be of greater power than it would be advisable to employ.

When the object is simply to produce an evacuation, a clyster of warm water, with a little starch dissolved in it, is employed in a quantity of ten or twelve ounces; but where a specific action is to be produced, as of an anodyne or astringent nature, the quantity should not exceed four or five ounces.

Of the above clysters, the first has for its basis the compound decoction of chamomile, (p. 321.); it is useful in assisting the action of a purgative, or where the stomach will not bear medicine. The Fetid clyster is serviceable in the hysteric paroxysm, and in flatulent colic. The Opiate clyster is administered in diarrhœa, dysentery, and irritable state of the bladder and uterus. The clyster of Turpentine has been much recommended in peritoneal inflammation, in obstinate constipation, and to destroy ascarides; a mixture of oil of turpentine with thin gruel, or with the cathartic clyster, is perhaps preferable.

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# CHAP. XXVII.

## PILULÆ—PILLS.

Pills are formed from a mass sufficiently stiff and adhesive to preserve the round form which is given to them. Under this form, such medicines are generally exhibited as are nauseous, either in taste or flavour, and such as operate in a small dose. Few general rules require to be given with regard to their formation. Such of the ingredients as are capable of being reduced to powder are triturated to the requisite fineness; those which are of a softer consistence are then added, and if this is not sufficient to bring the whole to a proper consistence, a small quantity of syrup or mucilage is to be added; the former is preferable, as the latter, in drying, is liable to render the mass too hard. Some substances, as several of the gum-resins, become soft on beating, so as to form into pills. Light vegetable powders, when beat up with syrup, form a mass which is not sufficiently coherent to roll out. In this case it is necessary to add a little pure soap, which gives the necessary tenacity. Metallic preparations, which are heavy, and given in a small dose, are made into pills by the addition of some extract or conserve. If the pill mass is too soft, so that the pills, after being formed, do not keep their form, it may be made harder by the addition of a small quantity of any inactive vegetable matter, as powder of liquorice. After they are rolled out, they must, to prevent them from adhering, be covered

with the same powder, or, what is preferable, as less liable to become mouldy, starch or carbonate of magnesia: gold or silver leaf is also a good covering to pills, unless they contain mercury or sulphur. A pill ought not to exceed five grains in weight, or twelve may be formed from a drachm of the mass. They ought not to be prepared in too large a quantity at a time, as, if long kept, they become so hard as to be scarcely acted on in the stomach.

PILULÆ ALOETICÆ. Aloëtic Pills. Ed.

"Take of Socotorine Aloes reduced to powder, Hard Soap, equal weights. Beat them with Simple Syrup, so as to make a mass fit for pills."

PILULÆ ALOES COMPOSITÆ. Compound Aloes Pills. Lond. Dub.

"Take of Extract of Spiked (Hepatic, Dub.) Aloes, in powder, one ounce; Extract of Gentian, half an ounce; Oil of Caraway, forty minims; Simple Syrup, as much as is necessary. Beat them together until they form a mass."

UNDER either of these forms aloes is commonly exhibited as a cathartic, the dose being 10 or 15 grains. The second formula is not well contrived, for the extract of gentian and the aloes act on each other, and render the mass tòo soft to form into pills; the addition of syrup will make the compound still more fluid, and instead of it some powder should rather be added, or the gentian be dispensed with.

PILULÆ ALOES ET ASSAFŒTIDÆ. Pills of Aloes and Assafœtida. Ed.

"Take of Socotorine Aloes in powder, Assafœtida, Hard Soap, equal parts. Beat them into a mass with mucilage of gum-arabic."

THESE pills are occasionally employed in amenorrhœa, hysteria, dyspepsia attended with flatulence, and in tympanitis, two or three being taken at bed-time. They prove useful by obviating costiveness.

PILULÆ ALOES ET MYRRHÆ. Pills of Aloes and Myrrh. Ed.

"Take of Socotorine Aloes, four parts; Myrrh, two parts; Saffron, one part. Beat them into a mass with Simple Syrup."

PILULÆ ALOES CUM MYRRHA. Pills of Aloes and Myrrh. Lond. Dub.

"Take of Extract of Spiked (Hepatic, Dub.) Aloes, two ounces; Saffron, Myrrh, of each an ounce; Simple Syrup, a sufficient quantity. Rub the aloes and myrrh separately into powder, then beat the whole together until they form a mass."

THESE pills, under the name of Rufus's Pills, have long been in use, as affording a moderately stimulating cathartic, useful in dyspepsia connected with costiveness; sometimes used also in hypochondriasis, hysteria, and in jaundice. Their dose is ten or fifteen grains.

PILULÆ AMMONIARETI CUPRI. Pills of Ammoniaret of Copper. Ed.

"Take of Ammoniaret of Copper, rubbed into fine powder, sixteen grains; Crumb of Bread, four scruples; Water of Subcarbonate of Ammonia, as much as may be sufficient. Beat them into a mass, which divide into thirty-two equal pills."

It is under this form that ammoniaret of copper is given in epilepsy and the other spasmodic diseases in which it has been employed. Half a grain of it is contained in each pill. One pill is given at first, night and morning, and the dose is gradually increased, as far as the stomach and general system will bear it, until a cure is obtained, or the remedy has received a fair trial.

Pilulæ assafœtidæ compositæ. Compound Assafœtida Pills. Ed.

"Take of Assafœtida, Galbanum, Myrrh, of each eight parts; Rectified Oil of Amber, one part. Beat them into a mass with simple syrup."

Pilulæ galbani compositæ. Compound Pills of Galbanum. Lond. Dub.

"Take of Galbanum, an ounce; Myrrh, Sagapenum, of each one ounce and a half; Assafœtida, half an ounce; Simple Syrup, (Treacle, Dub.) as much as may be sufficient. Beat them together, and form a mass."

These compositions, though under different names, are similar. They form a substitute for the Gum Pills of the older Pharmacopœias, and afford a stimulating aperient and antispasmodic, used in hysteria and amenorrhœa; two or three of them being taken occasionally at bed-time. They sometimes prove useful too, in a similar dose, in chronic catarrh, by checking the increased secretion from the mucous glands of the lungs.

Pilulæ colocynthidis compositæ. Compound Colocynth Pills. Ed.

"Take of Socotorine Aloes, Scammony, of each eight parts; Colocynth Pulp, four parts; Oil of Cloves, Sulphate of Potash, of each one part. Let the aloes and scammony be reduced, with the salt, to powder; then let the colocynth, rubbed into a fine powder, and the oil, be added. Lastly, beat them with mucilage of gum-arabic into a mass."

Pilulæ colocynthidis compositæ. Compound Colocynth Pills. Dub.

"Take of Colocynth Pulp, half an ounce; Hepatic Aloes, Scammony, of each an ounce; Spanish Soap, two drachms; Sulphate of Potash, Oil of Cloves, of each a drachm; Treacle, a sufficient quantity. Reduce the aloes, scammony, and colocynth separately to powder, then mix together the colocynth, pulp, and the oil, and, lastly, rub the whole into a mass with the soap and treacle."

The compositions are of similar powers. They afford a stronger cathartic than the simple aloëtic pill; and accordingly this compound pill is used in constipation, to obviate habitual costiveness. Two pills are a dose.

Pilulæ gambogiæ compositæ. Compound Gamboge Pills. Ed.

"Take of Gamboge in powder, Socotorine Aloes in powder, Aromatic Powder, of each one part; Hard Soap, two parts. Mix the powders; then, having added the soap, beat them into a mass with simple syrup."

Pilulæ cambogiæ compositæ. Compound Gamboge Pills. Lond. Dub.

"Take of Gamboge in powder, a drachm; Extract of Spiked (Hepatic, Dub.) Aloes in powder, a drachm and a half; Ginger in powder, half a drachm; Hard Soap, two drachms. Mix the powders together; then, adding the soap, beat the whole into one mass."

By the addition of the gamboge to the aloes, its cathartic power is increased, and a composition afforded more active than the aloetic pill. Two or three pills are a dose.

Pilulæ hydrargyri. Mercurial Pills. Ed.

"Take of Purified Quicksilver, Conserve of Red Rose, of each one ounce; Starch, two ounces; Mucilage of Gum-Arabic, as much as may be necessary. Rub the quicksilver with the conserve, in a glass mortar, until the globules entirely disappear, adding, as there may be occasion, a little of the mucilage of gum-arabic; then add the starch, and beat, with a little water, into a mass, which is to be immediately divided into four hundred and eighty pills."

Pilulæ hydrargyri. Pills of Quicksilver. Lond. Dub.

"Take of Purified Quicksilver, two drachms; Confection of Red Rose, three drachms; Liquorice Root (Extract of Liquorice, Dub.) in powder, one drachm. Rub the quicksilver with the confection until the globules no longer appear, then, adding the liquorice powder, beat the whole together so as to form a mass."

The trituration of the quicksilver in this preparation was formerly supposed to reduce it merely to a state of extreme mechanical division. But there is every reason to believe that an oxidation of the metal is effected, and that the medicinal efficacy of the preparation depends on the protoxide of mercury. Quicksilver, in its metallic state, being inert with regard to the living system, the activity of the preparation itself is a presumption of this; but it is farther known, that by agitation with atmospheric air, quicksilver affords a portion of a grey powder, soluble in muriatic acid, and which must therefore be an oxide, metallic quicksilver being insoluble in that acid. This oxidation must be effected more readily when the surface of the metal is extended, and its continuity is divided by the interposition of any viscous matter, and hence the advantage derived from the trituration of it with substances of this kind, in the preparation of the mercurial pill. Different substances have been employed, syrup, mucilage, honey, and others. The Colleges have now agreed in preferring the Conserve of Rose, it having been supposed that this is superior to the others in facilitating the operation. Much attention is requisite that the trituration be continued until the extinction is completed, as on this the efficacy of the pill depends. This is known by rendering the matter a little thinner by the addition of water, and extending it by rubbing on a glass plate on paper, when the globules, if any remain, will be apparent. Starch has been selected by the Edinburgh College to form it into a mass, and is preferable to liquorice powder, as not being liable to become mouldy. Care should be taken, as Dr. Paris remarks, that the conserve of roses do not contain sulphuric acid, which is often added to it to improve its colour, but which might form the deleterious subsulphate of mercury in the pill. A grain of mercury is contained in each

pill, weighing four grains, prepared according to the formula of the Edinburgh Pharmacopœia; the same quantity is contained in three grains of the others.

This pill, usually termed Blue Pill, is the preparation of mercury that is upon the whole most generally used for obtaining the general action of this metal on the system; and while it is milder in its operation than some other mercurials, and has less determination to the intestinal canal, it is sufficiently active and certain. The common dose, given with the view of inducing the usual mercurial action, is, two pills at bed-time and one in the morning, which, in particular cases and habits, requires to be increased. Four or six pills given at once commonly excite purging.

Pilulæ opiatæ, *olim Pilulæ Thebaicæ.* Opiate Pills. Ed.

"Take of Opium, one part; Extract of Liquorice, (soap?) seven parts; Jamaica Pepper, two parts. Beat the opium and the soap into a pulp; then add the Jamaica pepper rubbed to powder, and, beating them well, reduce them to a mass."

Pilulæ saponis cum opio. Pills of Soap with Opium. Lond. Dub.

"Take of Hard (Turkey, Dub.) Opium, rubbed to powder, half an ounce; Hard Soap, two ounces. Beat them together until they form one mass."

Pilulæ e styrace. Pills of Storax. Dub.

"Take of Purified Storax, three drachms; Turkey Opium, Saffron, of each a drachm. Beat them together, mixing them thoroughly."

The articles which, in these compositions, are added to the opium, have no important effect on its operation; they serve merely to disguise it; and, where it is necessary, which it occasionally is, to conceal the administration of opium from the patient, they afford convenient forms. Even the name sometimes requires to be concealed in a prescription; and hence the reason of the names given by the London and Dublin Colleges being derived from the trivial ingredients. It is only to be regretted, that the proportion of opium is not the same in all of them. Two pills, or ten grains of the pill of the Edinburgh Pharmacopœia, contain one grain of opium; while in the formula of the London and Dublin College the proportion is larger, five grains or one pill containing one grain.

Pilulæ rhei compositæ. Compound Pills of Rhubarb. Ed.

"Take of the Root of Rhubarb, in powder, one ounce; Socotorine Aloes, six drachms; Myrrh, half an ounce; Volatile Oil of Peppermint, half a drachm. Beat them into a mass with syrup of orange-peel."

This is a moderate laxative, much employed, especially in dyspeptic affections, to obviate costiveness, and stimulate gently the stomach and intestines; hence known by the name of Stomachic Pills. Two pills are taken at bed-time; they operate in general without occasioning any irritation, and evacuate the contents of the intestines without inducing purging.

Pilulæ Scilliticæ. Squill Pills. Ed.

"Take of the Dried Root of Squill, rubbed to a fine powder, one scruple; Gum Ammoniac, Lesser Cardamom Seeds in powder, Extract of Liquorice, of each one drachm. Beat them with a simple syrup into a mass."

Pilulæ scillæ compositæ. Compound Squill Pills. Lond. Dub.

"Take of the Root of Squill, recently dried, and beat to powder, a drachm; Ginger Root, in powder, Hard Soap, of each three drachms; Gum Ammoniac, in powder, two drachms. Mix the powders: then beat them with the soap, and add as much syrup (treacle, Dub.) as may be sufficient to give the due consistence."

Under the form of these compositions, which have long been officinal, and which do not differ materially from each other, squill is given as an expectorant in dyspnœa and chronic catarrh, two pills being taken morning and evening. Any efficacy they have depends on the squill. But there appears to be no advantage in reducing so much its activity by the addition of so large a proportion of other matter; and as squill, when long kept, is liable to have its strength impaired, it is perhaps preferable that it should be given under some form of extemporaneous preparation.

Pilulæ subcarbonatis sodæ. Pills of Subcarbonate of Soda. Ed.

"Take of Dried Subcarbonate of Soda, four parts; Hard Soap, three parts. Beat into a mass with simple syrup."

This form of exhibiting soda was first recommended by Dr. Beddoes, and appears to be a very convenient preparation for exhibiting that substance. The mass should be very thick, and contain as little water as possible.

Pilulæ submuriatis hydrargyri compositæ. Ed. Pilulæ calomelanos compositæ. Dub. Compound Pills of Calomel.

"Take of Calomel, Precipitated Sulphuret of Antimony, of each one part, (drachm, Dub.); Guaiac in powder, two parts, (drachms, Dub.) Rub the calomel with the sulphuret, and then with the gum-resin, and finally beat into a mass with mucilage of gum-arabic, (treacle, Dub.)"

Pilulæ hydrargyri submuriatis compositæ. Compound Pills of Submuriate of Quicksilver. Lond.

"Take of the Submuriate of Quicksilver, Precipitated Sulphuret of Antimony, of each two drachms; Gum-Resin of Guaiac beat to powder, half an ounce; Rectified Spirit, half a drachm. Triturate the submuriate of quicksilver with the precipitated sulphuret of antimony, then with the gum-resin of guaiac, and add the spirit so as to give the proper consistence."

This, under the name of Plummer's Pill, has been used as an alterative in cutaneous diseases and in chronic rheumatism, in a dose of ten grains. In cutaneous affections connected with syphilis it is sometimes serviceable.

Pilulæ sulphatis ferri compositæ. Compound Pills of the Sulphate of Iron. Ed.

"Take of Sulphate of Iron in powder, one ounce; Extract of

Chamomile, one ounce and a half; Volatile Oil of Peppermint, a drachm. Beat them into a mass with simple syrup."

This affords a very good chalybeate, and may be given in those cases where steel is indicated.

Pilulæ ferri compositæ. Compound Pills of Iron. Lond. Dub.

"Take of Myrrh, beat to powder, two drachms; Subcarbonate of Soda, Sulphate of Iron, Sugar, (raw, Dub.) of each a drachm. Triturate the myrrh with the subcarbonate of soda; then having added the sulphate of iron, (and sugar, Dub.), triturate them again: lastly, beat the whole together, (with treacle, Dub.) until they form an uniform mass."

This is the same composition, with regard to the active ingredients, as forms the basis of the Compound Mixture of Iron, already noticed, (p. 308); and it may be occasionally convenient to prescribe it under the form of pill, or to form the mixture from it extemporaneously by diffusion in water. The addition in the Dublin formula of treacle is unnecessary, as the mass is quite soft enough to form into pills.

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## CHAP. XXVIII.

### TROCHISCI—TROCHES.

Troches, or Lozenges, consist of powders mixed with mucilage, in such a proportion, that when dried they are firm and hard. While in the state of a soft paste they are cut into small square or round tablets, and these are hardened by drying. The form is one adapted principally to such medicines as are designed to dissolve slowly in mouth; and hence they are rendered pleasant by the addition of a large proportion of sugar. They are seldom active remedies, but are employed principally in affections of the mouth or throat. As of little importance they have been rejected in the Dublin and in the late edition of the London Pharmacopœia, and a few only are retained by the Edinburgh College.

Trochisci carbonatis calcis. Troches of Carbonate of Lime. Ed.

"Take of Prepared Carbonate of Lime, four ounces; Gum-Arabic, one ounce; Nutmeg, one drachm; Refined Sugar, six ounces. Rub these to powder, and make them into a mass with water, fit for forming troches."

This is a pleasant form under which carbonate of lime may be given as an antacid, though the quantity of saccharine matter may perhaps favour the production of acid in the stomach; and either from this, or from not being well prepared in the shops, they are little used.

TROCHISCI CARBONATIS MAGNESIÆ. Carbonate of Magnesia Troches. Ed.

"Take of Carbonate of Magnesia, six ounces; Refined Sugar, three ounces; Nutmeg, a scruple. Reduce to powder, and form into troches with the mucilage of gum-tragacanth."

THESE lozenges are used to correct acidity in the stomach.

TROCHISCI GLYCYRRHIZÆ GLABRÆ. Liquorice Troches. Ed.

"Take of Extract of Liquorice, Gum-Arabic, of each one part; Refined Sugar, two parts; Boiling Water, as much as may be necessary. Dissolve in the water and strain; then evaporate the solution with a gentle heat into a mass, which form into troches."

THESE, from their demulcent quality, may be used to allay coughing in catarrh; but the extract of liquorice is equally effectual, and when purified by solution in water, inspissated, so as to be of a firm consistence, and mixed with half its weight of gum-arabic, forming what is named Refined Liquorice, is more grateful.

TROCHISCI GLYCYRRHIZÆ CUM OPIO. Liquorice Troches with Opium. Ed.

"Take of Opium, two drachms; Tincture of Tolu Balsam, half an ounce; Symple Syrup, eight ounces; Extract of Liquorice softened with warm water, Gum-Arabic in powder, of each five ounces. First rub the opium thoroughly with the tincture; then add gradually the syrup and the extract; afterwards sprinkle in the powder of gum-arabic; and, lastly, dry the mass, that it may be formed into troches, each weighing ten grains."

THESE are the most active troches in the Pharmacopœia, and are effectual in relieving the tickling cough attending catarrh. The opium is the ingredient on which their efficacy principally depends, its local operation lessening the irritation which gives rise to coughing: the others cover its taste and flavour, and add a demulcent quality. Six troches contain nearly a grain of opium; and from six to twelve may be taken in twenty-four hours. The composition would be improved, if the proportion of opium were diminished, as they would be less ungrateful, their action would be more gradual, and a greater number could be taken. A substitute might be found too for the balsam of Tolu, the flavour of which is unpleasant, and which cannot communicate any virtue.

TROCHISCI GUMMOSI. Gum Troches. Ed.

"Take of Gum-Arabic, four parts; Starch, one part; Refined Sugar, twelve parts. These being rubbed to powder, are to be formed into a mass with rose water, fit for forming troches."

THIS composition is designed as a demulcent, but is scarcely ever used; it is not very pleasant, and gum-arabic, when pure, answers the same purpose.

TROCHISCI NITRATIS POTASSÆ. Troches of Nitrate of Potash. Ed.

"Take of Nitrate of Potash, one part; Double Refined Sugar, three parts. Beat them to powder, and, with mucilage of gum-tragacanth, make them into a mass proper for forming troches."

Under this form nitrate of potash is used as a refrigerant in angina tonsillaris, and to allay the sense of heat attending salivation, and abate the inflammation, being allowed to dissolve slowly in the mouth. They do not retain their form, being liable to become humid, and a mixture of nitre and sugar in powder answers equally well. They should not be taken in large quantity, as they sometimes produce considerable uneasiness in the stomach; when they do so, it is recommended to drink largely of some mild fluid.

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# CHAP. XXIX.

## OLEOSA—OILY PREPARATIONS.

The preparations included in this chapter are combinations of expressed oils with more active substances, principally designed for external application, the oil moderating their action, or communicating a convenient form.

Oleum ammoniatum. Ammoniated Oil. Ed. Linimentum ammoniæ. Liniment of Ammonia. Dub.

"Take of Olive Oil, eight parts, (two fluid-ounces, Dub.); Water of Ammonia, one part, (two fluid-drachms, Dub.) Mix by shaking them together."

Linimentum ammoniæ fortius. Strong Liniment of Ammonia. Lond.

"Take of Liquor of Ammonia, a fluid-ounce; Olive Oil, two fluid-ounces. Shake them together until they unite."

Linimentum ammoniæ subcarbonatis. Liniment of Subcarbonate of Ammonia. Lond.

"Take of Liquor of Subcarbonate of Ammonia, a fluid-ounce; Olive Oil, three fluid-ounces. Shake them together until they unite."

In these compositions, the alkali combines with the expressed oil, forming a thick white saponaceous compound; in the last the combination with the alkaline carbonate is but very imperfect, and it is therefore an injudicious preparation. They are all used as rubefacients, and are convenient for application; a piece of flannel moistened with any of them being applied to the part, or sometimes friction being made with the liniment for a short time. From the former mode of application, the rubefacient operation is sufficiently obtained; it is a remedy often employed in cynanche tonsillaris, as less severe than a blister. The composition of the Edinburgh College seems on the whole best adapted to general use, as of medium strength, and, if necessary, it is easy to render it a little more active, by the addition of more ammonia, or, on the contrary, to weaken its stimulating power by adding a larger proportion of oil.

Oleum camphoratum. Camphorated Oil. Ed. Dub.

"Take of Olive Oil, four parts, (an ounce, Dub.); Camphor, one

part, (a drachm, Dub.) Mix them, so that the camphor may be dissolved."

This is a form under which camphor is frequently applied externally as a stimulant and anodyne in rheumatism and other similar affections, and is the most convenient one when it is to be applied by friction. It is sometimes rendered more active by the addition of a little ammonia.

Oleum lini cum calce, *sive Linimentum Aquæ Calcis.* Liniment of Lime Water. Ed.

"Take of Lintseed Oil, Lime Water, of each equal parts. Mix them."

Linimentum calcis. Liniment of Lime. Dub.

"Take of Lime Water, Olive Oil, of each by measure three ounces. Mix by agitation."

This liniment, commonly called Carron Oil, is a saponaceous compound, formed by the mutual chemical action of the lime, water, and oil. It is a thick bland fluid, of a white colour, and is used as a soothing application to inflamed parts, more particularly to burns, being spread over the surface with a feather: the previous application of oil of turpentine facilitates the cure. It requires to be extemporaneously prepared, as after a little time the soapy matter separates from the water.

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## CHAP. XXX.

### LINIMENTA, UNGUENTA, ET CERATA—LINIMENTS, OINTMENTS, AND CERATES.

These are compositions of a soft consistence, having some unctuous substance for their basis, such as oil, lard, spermaceti or wax. When the consistence is so soft as to be thick, but nearly fluid, it is termed a Liniment; when it is more firm, it is an Ointment; and when still harder, forms a Cerate. These degrees of consistence depend on the proportions of the ingredients. Where the oil is in large quantity a liniment is formed, and the addition to this of a large proportion of wax forms an ointment or cerate.

Formerly ointments were numerous and complicated in their composition, and surgeons adapted, with much formality, different ointments to different indications. The practice is now more simple; the principal intention in these applications is to keep the parts soft and easy, and to exclude the atmospheric air, and therefore the simplest composition that is of a proper consistence and tenacity answers the purpose. It is only in a few cases that substances are added with the view of obtaining peculiar effects from their stimulant, or sometimes their specific operation, or from their chemical action. The consistence of a cerate is usually the most convenient for continued application, that of an ointment being rather too thin, especially as it is rendered thinner by the heat of the part applied.

The Dublin College have given the following general directions respecting ointments:

"The calamine used in forming ointments is to be prepared in the same manner as chalk.

"In the composition of ointments and plasters, the wax, resin and fatty matter are to be melted with a moderate heat; then removed from the fire, and constantly stirred until they cool, adding at the same time as they stiffen the dry substances, if any such are to be used, in very fine powder."

ADEPS PRÆPARATA. Prepared Lard. Lond.

"Cut the Lard into small pieces, then press it, liquefied by a gentle heat, through linen."

SEVUM PRÆPARATUM. Prepared Suet. Lond.

"Cut Suet into pieces; then press it, melted by a gentle heat, through linen."

ADEPS SUILLUS PRÆPARATUS. Prepared Hogs Lard. Dub.

"Let fresh Lard, cut into small pieces, be melted by a gentle heat, and strained by pressing it through a cloth. Lard which is prepared by those who sell it, and which is preserved with salt, is to be melted with twice its weight of boiling water, the mixture being well stirred. It is then to be set aside to cool, and the lard is to be separated."

ADEPS OVILLUS PRÆPARATUS. Prepared Mutton Suet. Dub. "Is prepared in the same manner."

THE design of these processes is to free the fat from the membranous fibres intermixed with it; but as it generally prepared before it is brought to the shop, the Edinburgh College have omitted the directions they formerly gave. If the heat be raised too high, the fat acquires a brown colour, and empyreumatic smell; it is therefore usually melted with a little water, by which this is prevented. It is of some importance that the fat be fresh with which ointments are made, for if rancid the ointments are rendered acrid, and produce eruptions.

LINIMENTUM SIMPLEX. Simple Liniment. Ed.

"Take of Olive Oil, four parts; White Wax, one part. Melt the wax by a gentle heat in the oil, and then shake the mixture continually till it hardens. The same is done with the ointment and cerate."

UNGUENTUM SIMPLEX. Simple Ointment. Ed.

"Take of Olive Oil, five parts; White Wax, two parts."

CERATUM SIMPLEX. Simple Cerate. Ed.

"Take of Olive Oil, six parts; White Wax, three parts; Spermaceti, one part."

CERATUM SIMPLEX. Simple Cerate. Lond.

"Take of Olive Oil, four fluid-ounces; Yellow Wax, four ounces. Add the oil to the wax melted, and mix."

UNGUENTUM CETACEI. Spermaceti Ointment. Lond.

"Take of Spermaceti, six drachms; White Wax, two drachms; Olive Oil, three fluid-ounces. Having melted them with a gentle fire, stir them constantly until they cool."

Unguentum cetacei. Ointment of Spermaceti. Dub.

"Take of White Wax, half a pound; Spermaceti, one pound; Prepared Lard, three pounds. Form an ointment."

Ceratum cetacei. Spermaceti Cerate. Lond.

"Take of Spermaceti, half an ounce; White Wax, two ounces; Olive Oil, four fluid-ounces. To the spermaceti and wax melted, add the oil, and stir them until they cool."

Unguentum ceræ flavæ. Ointment of Yellow Wax. Dub.

"Take of Purified Yellow Wax, a pound; Prepared Lard, four pounds. Form an ointment."

Unguentum ceræ albæ. Ointment of White Wax. Dub. "Use White Wax."

These compositions differ chiefly in consistence. They are applied spread on linen as usual dressings to slight wounds, excoriations, and blistered surfaces. The simple cerate affords the composition which, from its consistence, is best adapted to this. The composition known by the name of Cold Cream, or Ceratum Galeni, and which is officinal in the Parisian Pharmacopœia, is made by beating together four ounces of White Wax melted, one pound of Almond Oil, and a pint of Rose Water; it should be very light and white; it is much used to allay slight irritation of the skin.

Unguentum resinosum. Resinous Ointment. Ed.

"Take of Hogs Lard, eight parts; White Resin, five parts; Yellow Wax, two parts. Melt them all by a gentle heat, and shake the mixture until it becomes cold and hardens."

Ceratum resinæ. Cerate of Resin. Lond.

"Take of Yellow Resin, Yellow Wax, each a pound; Olive Oil, a pint. Melt the wax and resin with a slow fire, then add the oil, and strain the cerate through linen while warm."

Unguentum resinæ albæ. Ointment of White Resin. Dub.

"Take of Yellow Wax, a pound; White Resin, two pounds; Prepared Lard, four pounds. Form an ointment, which, while hot, strain through a sieve."

The addition of the resin renders this more stimulating than the preceding ointments. Hence it is used as a dressing where the object is to promote suppuration.

Unguentum pulveris cantharidis vesicatoriæ. Ointment of Powder of Cantharides. Ed.

"Take of Resinous Ointment, seven parts; Powder of Cantharides, one part. Throw the powder over the ointment when it is melted, and shake till it becomes hard."

Ceratum cantharidis. Cerate of Cantharides. Lond.

"Take of Spermaceti Cerate, six drachms; Cantharides rubbed to a very fine powder, a drachm. To the cerate, softened by heat, add the cantharides, and mix."

This is the ointment commonly employed to establish a purulent discharge, or form a superficial issue in the part to which a blister has been applied; this it does from the acrid and stimulating quality of the cantharides, which changes the serous discharge from the

blister into one of a purulent nature, and by continuing the application, this may be kept up for any length of time. In preparing it, the cantharides ought to be reduced to a very fine powder.

UNGUENTUM INFUSI CANTHARIDIS VESICATORIÆ. Ointment of Infusion of Cantharides. Ed.

"Take of Cantharides, White Resin, Yellow Wax, of each one part; Venice Turpentine, Hogs Lard, of each two parts; Boiling Water, four parts. Macerate the cantharides in the water for a night, and strain the liquor, pressing it strongly; having added the lard, boil it until the water is evaporated; then add the wax and resin. These being melted and removed from the fire, add the turpentine, and mix thoroughly."

UNGUENTUM CANTHARIDIS. Ointment of Cantharides. Lond. Dub.

"Take of Cantharides, rubbed to a very fine powder, two ounces; Distilled Water, eight fluid-ounces; Resinous Cerate, (Ointment of White Resin, Dub.), eight ounces. Boil down the water with the cantharides to one half, and strain. Mix the cerate with the strained liquor, and evaporate to the proper consistence."

THE ointment with the powder of cantharides sometimes occasions pain and irritation. The composition obtained by this process is designed as a milder application adapted in such cases to answer the same indication. The water, by infusion on the cantharides, extracts the acrid matter; but this, from being in a state of solution, is, after the subsequent evaporation, diffused through the unctuous matter in a state of finer division than the powder can be: it is also, from the proportions ordered, in smaller quantity, but its stimulating quality is aided by the turpentine, and it is sufficient to keep up the purulent discharge. In preparing this ointment, it is necessary to stir the evaporated infusion well with the cerate, as they are little disposed to unite.

UNGUENTUM CONII. Hemlock Ointment. Dub.

"Take of fresh Hemlock Leaves, Prepared Hogs Lard, of each two pounds. Boil the hemlock leaves in the lard until they become crisp, then express through linen."

THE narcotic principle of hemlock appears to be soluble in heated oil, or at least exists in it in a state of intimate diffusion. This ointment is used as an anodyne application to irritable sores, pills, schirrous glandular swellings, and in cancer.

UNGUENTUM IODINII. Iodine Ointment. Dub.

"Take of Iodine, a scruple; Prepared Hogs Lard, an ounce. Rub together to form an ointment."

IODINE ointment is of an orange-brown colour, but by keeping becomes pale at the surface. Rubbed on the skin it causes an orange-coloured stain, which, however, is not long in disappearing. It has been frequently used with success to discuss tumours, by stimulating the absorbents, and is advantageously conjoined with the internal administration of the tincture of iodine.

UNGUENTUM POTASSÆ HYDRIODATIS. Ointment of Hydriodate of Potash. Dub.

"Take of Hydriodate of Potash, a scruple; Prepared Hogs Lard, an ounce. Rub together to form an ointment."

This ointment should be white; but on being kept, the lard absorbs oxygen, which acting on the hydriodic acid attracts its hydrogen, and a little iodine is separated, which renders the colour somewhat brown. It is employed for the same purposes as the preceding ointment. In the cure of bronchocele or enlarged scrofulous glands, half a drachm of either ointment is rubbed, morning and evening, on the part; and it has been found, that by this mode of practice tumours were removed, which the internal use of iodine alone was unable to dissipate. Sometimes the use of the ointment produces at first little effect; but on the application of leeches, the action of the iodine appears,—a circumstance depending probably on the effect of blood-letting in favouring absorption.

Dr. Ure has recommended an ointment of an ounce of hogs lard and a drachm of iodide of zinc;—a drachm of the ointment to be used at each friction. Ointments have also been made with iodide and periodide of mercury.

Ceratum juniperi sabinæ. Cerate of Savine. Ed. Lond.

"Take of Fresh Savine Leaves bruised, two parts; Yellow Wax, one part; Prepared Hogs Lard, four parts. Melt the wax and lard together; boil the Savine Leaves with them, and then express through a linen cloth."

Unguentum sabinæ. Ointment of Savine. Dub.

"Take of the Fresh Leaves of Savine, plucked from the stalks, and bruised, half a pound; Prepared Lard, two pounds; Yellow Wax, half a pound. Boil the leaves with the lard until these become crisp, then strain with expression. Lastly, add the wax, and melt them together."

This ointment is designed as a substitute for the cantharides ointment, as an application to excite suppuration, and keep up a purulent discharge, which it is said to do without producing pain or irritation, and without being liable to occasion strangury,—consequences that occasionally result from the common issue ointment. It is also sometimes used prepared from the leaves of savine, reduced to fine powder, and mixed with lard, but is then intolerably acrid.

Unguentum gallarum. Ointment of Galls. Ed. Dub.

"Take of Galls in powder, one part; Hogs Lard, eight parts. Mix them thoroughly."

This is an astringent ointment, frequently employed in hæmorrhoids, when the inflammatory stage has passed, and in prolapsus ani.

Unguentum picis liquidæ. Ointment of Tar. Ed.

"Take of Tar, five parts; Yellow Wax, two parts. Melt the wax with a gentle heat, then add the tar, and continue shaking the mixture until it becomes cold and hard."

Unguentum picis liquidæ. Ointment of Tar. Lond. Dub.

"Take of Tar, Prepared Suet, each a pound, (half a pound, Dub.) Melt them together, and strain them through linen."

This stimulating ointment is sometimes applied to foul ulcers, and has been used with advantage in tinea capitis. It derives its power from the empyreumatic oil and pyroligneous acid of the tar.

Unguentum picis nigræ. Pitch Ointment. Lond.

"Take of Pitch, Yellow Wax, Yellow Resin, of each nine ounces; Olive Oil, a pint. Melt them together, and strain through linen."

This is applied to the same purposes as the preceding ointment, from which it differs a little in consistence, and in its smell being less strong.

Unguentum acidi nitrosi. Ointment of Nitrous Acid. Ed.

"Take of Hogs Lard, one pound; Nitrous Acid, six drachms. Mix the acid gradually with the melted lard, and beat the mixture thoroughly while it cools."

Unguentum acidi nitrici. Ointment of Nitric Acid. Dub.

"Take of Olive Oil, a pound; Prepared Lard, four ounces; Nitric Acid by measure, five drachms and a half. Melt the oil and the fat together in a glass vessel, add the acid, and stir constantly with a glass rod until they become firm."

In this preparation part of the acid is decomposed, and part of it is combined with the lard. It is designed as an application in cutaneous affections, and has been said to be similar in its effects to the preceding ointment. It appears, however, considerably inferior in efficacy, and since its first introduction it has been little used.

Unguentum acidi sulphurici. Ointment of Sulphuric Acid. Dub.

"Take of Sulphuric Acid, a drachm; Prepared Hogs Lard, an ounce. Mix."

This ointment has been introduced into the Dublin Pharmacopœia, being said to be useful in the cure of scabies. The acid partially chars the animal matter, whence the ointment has a dark colour, and a disagreeable odour; if mixed with an iron spatula, it is still darker; it has no particular advantage, and is inconvenient from its corrosive quality.

Unguentum subacetatis cupri, *olim Unguentum Æruginis*. Ointment of Subacetate of Copper. Ed.

"Take of Resinous Ointment, fifteen parts; Subacetate of Copper, reduced to a very fine powder, one part. Sprinkle the subacetate on the melted ointment, and then shake the mixture continually until it hardens."

Unguentum cupri subacetatis. Ointment of Verdigris. Dub.

"Take of Prepared Verdigris, half an ounce; Ointment of White Resin, a pound; Olive Oil, an ounce. Rub the verdigris with the oil, then add them to the ointment of white resin melted, and mix."

This ointment is used as a stimulant and escharotic, applied to foul ulcers. It is rather too active, and in general requires to be mixed with a proportion of resinous or simple ointment; nor is it used but as an occasional dressing. It is said to be a valuable remedy in curing ring worm, being applied to the shaved and washed

scalp, and is sometimes used as an application to the palpebræ, when they are affected in scrofulous ophthalmia.

UNGUENTUM HYDRARGYRI. Ointment of Quicksilver. Ed.

"Take of Purified Quicksilver, Mutton Suet, of each one part; Hogs Lard, three parts. Rub the quicksilver thoroughly in a mortar with a little of the lard, until the globules disappear; then add the remaining fats. It may be made also with a double or triple proportion of quicksilver."

UNGUENTUM HYDRARGYRI FORTIUS. Stronger Ointment of Quicksilver. Lond.

"Take of Purified Quicksilver, two pounds; Prepared Hogs Lard, twenty-three ounces; Prepared Mutton Suet, one ounce. Rub first the quicksilver with the tallow and a little lard, until the globules disappear; then add the remaining lard, and mix them."

UNGUENTUM HYDRARGYRI. Ointment of Quicksilver. Dub.

"Take of Purified Quicksilver, Prepared Lard, equal weights. Rub them together in a marble or iron mortar, until the globules of quicksilver disappear."

UNGUENTUM HYDRARGYRI MITIUS. Milder Ointment of Quicksilver. Lond.

"Take of the Stronger Ointment of Quicksilver, one pound; Prepared Hogs Lard, two pounds. Mix them."

UNGUENTUM HYDRARGYRI MITIUS. Milder Ointment of Quicksilver. Dub.

"This is made with double the weight of lard."

OF these ointments, the one always employed for mercurial friction, is that from equal weights of quicksilver and lard. The only use of the lard is to facilitate the extinction, as it is called, of the quicksilver, and the introduction of it through the cuticle; these purposes are attained from this proportion; and any larger quantity of unctuous matter merely renders it necessary to continue the friction longer. For application in some cutaneous affections, the milder ointment is sometimes used. The proportion of one part of quicksilver to four of unctuous matter, ordered in the Edinburgh Pharmacopœia, gives an ointment weaker than any that is used or kept in the shops; and it would be preferable, therefore, to order the preparation as in the other Pharmacopœias.

The extinction of the mercurial globules by trituration being a laborious process, various expedients have been contrived to facilitate it. Several of these are inadmissible, such as the use of sulphur or turpentine. In the ointment prepared with the former, the mercury is probably not in an active state; it is known by its black colour, and by the smell of sulphur exhaled when paper covered with it is kindled. Turpentine renders the ointment too acrid, so that when rubbed on the skin it produces irritation or inflammation; it also can be detected by the odour exhaled in burning. Rancid fat extinguishes the quicksilver better than recent fat, and may be allowed, as, by the action of the metal, the rancidity of the fat appears to be corrected. But the method which seems most effectual in assisting the process, is to add a small portion of old mercurial ointment, a sixteenth

part is in general sufficient, which itself containing much oxygen, may perhaps transfer it to the mercury, absorb fresh portions from the air, and transfer these, and thus the process be hastened. The trituration should be made at first with a little suet, as is now directed by two of the Colleges, lard not opposing sufficient resistance; the lard also is apt to become too fluid in warm weather, and allows the mercurial oxide to subside, while the suet preserves a due consistence. But it is scarcely requisite to add directions respecting this process, as the ointment is always prepared on the large scale with the aid of machinery, and the apothecary is saved a laborious and unhealthy occupation.

It has often been a subject of discussion, whether the mercury in these ointments is oxidated, or merely in a state of mechanical division. On the one side it may be urged, that the continued trituration must expose the mercury freely to the air, and facilitate its combining with oxygen, and this will not be impeded by the unctuous matter, which seems rather to promote the oxidation of metals by the action of the air, as is exemplified in the green crust which copper speedily acquires when thinly coated with grease; the medicinal efficacy of the ointment likewise is such as is obtained from other preparations containing the protoxide of mercury, while the metal itself has no medicinal power. On the other hand, it has been affirmed, that mercury rubbed *in vacuo* with a substance not capable of affording oxygen is as completely extinguished as in mercurial ointment; and farther, that from the ointment melted by heat there subsides only metallic mercury. Treated with ether also, which dissolves the lard, this ointment yields, according to M. Guibourt, only minute globules of Mercury. Experiments carefully made by Mr. Donovan seem to establish an intermediate result. He found that four ounces of mercurial ointment, melted at a temperature of 212°, deposited, out of 960 grains of mercury which they contained, 770 in the metallic state, leaving 190 grains of mercury which had been oxidized, and the medicinal activity he found to reside entirely in this latter portion; it is probable that the proportion of oxidated mercury in the ointment was still larger, as a part of it might be reduced by the reaction of the animal matter at a high temperature. It was at one time supposed, that the lard becoming rancid, as it always does in the process, generates sebacic acid, which uniting with the oxide produces a portion of protosebate of mercury in the ointment; but for this supposition there is no evidence, and the medicinal virtues are probably due wholly to the presence of the mercurial protoxide. Mr. Donovan concluded, from his experiments, that a better form of the ointment might be prepared, by directly combining lard with protoxide of mercury, which he effected by keeping them together for two hours, at a temperature of 350°, with continual stirring. Each ounce of lard dissolved 21 grains of protoxide. This ointment he found to be equally efficient with the common kind, and much less expensive.

Mercurial ointment is the form under which mercury is introduced into the system by external friction. It is a mode employed with advantage in cases where mercurials administered internally are lia-

ble to be determined to the intestines, so as to occasion griping or purging, or when it is necessary to introduce a large quantity of mercury speedily into the system; the general mercurial action being thus soon induced. It is likewise employed in some local affections, particularly bubo. One drachm of the strong ointment (that containing equal parts of mercury and lard) is introduced by friction on the skin in the evening, and frequently also in the morning, until the system is affected, the part on which the ointment is rubbed being occasionally changed to avoid irritation or inflammation. The weaker ointment is used only as a dressing to ulcers, or as a local application.

Unguentum oxidi hydrargyri cinerei, Ointment of Grey Oxide of Quicksilver. Ed.

"Take of Grey Oxide of Quicksilver, one part; Hogs Lard, three parts. Mix them thoroughly."

This is designed as a substitute for the mercurial ointment; and, as the quicksilver is fully oxidated, it has been supposed that it will prove more active and certain. It probably would have this advantage; but it has been said, that it is not easily introduced by friction, the unctuous matter passing through the cuticle without the whole of the oxide,—a difference which, if it do exist, must depend on the combination being less intimate.

Unguentum oxidi hydrargyri rubri. Ointment of Red Oxide of Quicksilver. Ed.

"Take of Red Oxide of Quicksilver by Nitric Acid, one part; Hogs Lard, eight parts. Mix them thoroughly."

Unguentum hydrargyri nitrico-oxydi. Ointment of Nitric Oxide of Quicksilver. Lond. Dub.

"Take of Nitric Oxide of Quicksilver, an ounce; White Wax, two ounces; Prepared Lard, six ounces. To the wax and lard melted together, add the nitric oxide of quicksilver, rubbed into a very fine powder, and mix."

This, commonly termed Red Precipitate Ointment, is applied as a mild escharotic to remove the diseased surface of ulcers, and as a stimulant to promote suppuration; and in cases of languid ulceration and chronic inflammation is often used with marked benefit. In some forms of ophthalmia much advantage is derived from it, particularly where the edges of the tarsi are raw or ulcerated, or where, from the continuance of inflammation, the vessels on the surface have become weakened, and where specks are beginning to form on the cornea; it is also useful in the scrofulous ophthalmia of children. Care ought to be taken in its preparation, that the powder is very fine: it ought also to be prepared only when it is to be used, or at least ought not to be long kept, as the mercurial subnitrate undergoes decomposition, which is indicated by the colour changing from red to grey. Dr. Duncan mentions, that if this ointment be mixed with any other containing resin, its colour changes to olive, and then to black.

Unguentum nitratis hydrargyri fortius, *vulgo Unguentum Citrinum.* Stronger Ointment of Nitrate of Quicksilver, commonly named Citrine Ointment. Ed.

"Take of Purified Quicksilver, one part; Nitrous Acid, two parts; Olive Oil, nine parts; Hogs Lard, three parts. Dissolve the quicksilver in the acid; then beat up the solution strongly with the lard and oil previously melted together, and beginning to cool, in a glass mortar, so as to form an ointment."

UNGUENTUM HYDRARGYRI NITRATIS. Ointment of Nitrate of Quicksilver. Lond.

"Take of Purified Quicksilver, an ounce; Nitric Acid, eleven fluid-drachms; Prepared Lard, six ounces; Olive Oil, four fluid-ounces. Dissolve the quicksilver in the acid; then mix the liquor, while still warm, with the fat and the oil melted together."

UNGUENTUM HYDRARGYRI NITRATIS, *vel Unguentum Citrinum*. Ointment of Nitrate of Quicksilver, or Citrine Ointment. Dub.

"Take of Purified Quicksilver, an ounce; Nitric Acid, eleven drachms and a half; Olive Oil, a pint; Prepared Lard, four ounces. Dissolve the quicksilver in the acid, mix in the oil and lard melted together, and form an ointment in the same manner as the nitrous acid ointment."

IN this ointment the nitrate of quicksilver is combined with the lard; and as there is an excess of nitric acid, it acts chemically on the fat, oxygenating it, and notwithstanding the quantity of oil used, gives to the composition a firm consistence.* It forms, like the preceding ointment, a very excellent application in various forms of chronic inflammation, such as psorophthalmia; it is also used in different kinds of cutaneous eruption, herpetic, or connected with superficial inflammation or ulceration. It is either rubbed gently on the part affected, or where this would produce irritation, it is applied, softened by heat, by a hair pencil.

* It is stated by Dr. Duncan, that citrine ointment, as commonly prepared, soon loses the golden yellow colour, and becomes slate grey, and very hard, and that the apothecary finds a difficulty in preparing it equal in colour and permanent softness to the empirical preparation, sold under the name of Golden Eye-Ointment. This, he adds, is done by Mr. Duncan of this city, who forms citrine ointment not inferior to the secret remedy, by employing a larger proportion of nitrous acid than is ordered in the Pharmacopœia, and by mixing it with the oil and lard at a high temperature. The ointment prepared by Mr. Duncan I have seen, and it appears to be of excellent quality; but my friend, Mr. J. F. Macfarlane, has shewn to me, ointment equal, if not superior, in colour and consistency, which he prepares by using exactly the proportions ordered in the Pharmacopœia. It is probable, therefore, that practical dexterity has more influence on the success of the operation than the adjustment of proportions. Though the Edinburgh College do not give particular directions as to the temperature requisite, Mr. Macfarlane informs me, that it has been his, and he believes the general practice, to heat the oil and lard nearly to their boiling temperature, and to pour in the solution, also heated, of mercury in nitric acid; a violent effervescence ensues, which is not, however, owing to the escape of nitric oxide, as Dr. Duncan supposed, but rather, I conceive, to the vaporization of the water of the acid; for, in performing the process, I have observed scarcely any vapours of nitrous acid to arise.

The Golden Eye-Ointment appears to have been considered by Dr. Duncan as analogous to citrine ointment, yet its colour is very different, being orange-red instead of yellow. To determine its nature, I melted a portion of it in a glass tube: a red powder subsided, which, when freed from the unctuous matter by the action of ether, proved to be the submtrate of mercury, or *red precipitate*. Dr. Paris states, that the Golden Ointment is also sometimes prepared with sulphuret of arsenic (orpiment,) beat up with lard or spermaceti ointment.—*Ed.*

UNGUENTUM NITRATIS HYDRARGYRI MITIUS. Milder Ointment of Nitrate of Quicksilver. Ed.

"This is made in the same manner as the preceding, with a triple proportion of lard and oil."

THIS is designed to afford an application milder than the former, and of a softer consistence; but, to obtain the latter convenience, it is better to reduce the strong ointment with the requisite proportion of lard, when it is to be used, as, from the operation of the acid, the milder ointment, even with the increased proportion of unctuous matter, is nearly equally firm as the stronger ointment.

UNGUENTUM HYDRARGYRI PRÆCIPITATI ALBI. Lond. UNGUENTUM HYDRARGYRI SUBMURIATIS AMMONIATI. Dub. Ointment of White Precipitate, or Ammoniated Submuriate of Mercury.

"Take of Ammoniated Submuriate of Mercury, a drachm; Prepared Lard, an ounce and a half. To the lard melted with a gentle heat, and while cooling, add the submuriate, and mix them well."

THIS is sometimes used as a very mild escharotic, and as a remedy in obstinate cutaneous eruptions.

UNGUENTUM ACETATIS PLUMBI. Ointment of Acetate of Lead. Ed.

"Take of Simple Ointment, twenty parts; Acetate of Lead, in fine powder, one part. Mix thoroughly."

CERATUM PLUMBI ACETATIS. Cerate of Acetate of Lead. Lond.

"Take of Acetate of Lead in powder, two drachms; White Wax, two ounces; Olive Oil, half a pint. Melt the wax in seven fluidounces of the oil; then add to them gradually the acetate of lead, rubbed down with the rest of the oil, and stir with a wooden spatula until they unite."

UNGUENTUM ACETATIS PLUMBI. Ointment of Acetate of Lead. Dub.

"Take of Ointment of White Wax, a pound and a half; Acetate of Lead, an ounce. Form an ointment."

THE preparations of lead have been supposed to possess a specific power in abating inflammation by local application. They are usually applied under the form of solution; but where that of ointment is preferred, this composition has been considered as preferable to any other, as containing the most active preparation of lead. It is accordingly often used as a dressing to inflamed parts.

UNGUENTUM CARBONATIS PLUMBI. Ointment of Carbonate of Lead. Ed.

"Take of Simple Ointment, five parts; Carbonate of Lead, in fine powder, one part."

UNGUENTUM PLUMBI CARBONATIS. Ointment of Carbonate of Lead. Dub.

"Take of Carbonate of Lead, reduced to very fine powder, two ounces; Ointment of White Wax, a pound. Form an ointment."

THIS has been used principally as an application to burns and superficial inflammation: it is said to have been of service in relieving neuralgia.

CERATUM PLUMBI COMPOSITUM. Compound Cerate. Lond.

"Take of Solution of Subacetate of Lead, two fluid-ounces and a half; Yellow Wax, four ounces; Olive Oil, nine ounces; Camphor, half a drachm. Mix the wax melted with eight fluid-ounces of the oil; then remove the mixture from the fire, and as soon as it begins to become thick, add gradually the solution of subacetate of lead, and stir them constantly with a wooden spatula. Lastly, mix with these the camphor dissolved in the remaining oil."

A composition similar to this was introduced by Goulard, as a form of applying lead in ointment. It has been known by the name of Goulard's Cerate, and has been supposed preferable to the preceding ointment. It may derive some advantage as a soothing application to inflamed parts, from its soft consistence, and from the subacetate of lead being diffused through it in a dissolved state.

CERATUM CARBONATIS ZINCI IMPURI. Cerate of Calamine. Ed.

"Take of Simple Cerate, five parts; Prepared Impure Carbonate of Zinc, one part. Mix them thoroughly."

CERATUM CALAMINÆ. Cerate of Calamine. Lond.

"Take of Prepared Calamine, Yellow Wax, each half a pound; Olive Oil, a pint. Mix the oil with the wax melted, then remove from the fire, and when they begin to thicken, add the calamine, and stir constantly until they cool."

UNGUENTUM CALAMINÆ. Calamine Ointment. Dub.

"Take of Ointment of Yellow Wax, five pounds; Prepared Impure Carbonate of Zinc dried, a pound. Rub the carbonate of zinc, so that it may be completely powdered, then add it to the ointment of yellow wax, and mix."

THIS is the common healing cerate, Turner's Cerate as it has been named, which has long been used as a dressing in slight wounds, excoriations and ulcers. It acts by excluding the air and keeping the surface to which it is applied soft; and is preferable to the composition of wax and oil alone, from the levigated calamine giving a degree of consistence, which is not altered by the heat of the body.

UNGUENTUM OXIDI ZINCI. Ointment of Oxide of Zinc. Ed.

"Take of Simple Liniment, six parts; Prepared Oxide of Zinc, one part. Mix thoroughly."

UNGUENTUM ZINCI. Lond.

"Take of Oxide of Zinc, an ounce; Prepared Lard, six ounces. Mix."

UNGUENTUM OXYDI ZINCI. Ointment of Oxide of Zinc. Dub.

"Take of Ointment of White Wax, a pound; Oxide of Zinc, prepared in the same manner as chalk, two ounces. Melt the ointment, and mix in the oxide in very fine powder."

THIS was introduced as a substitute for the calamine cerate, oxide of zinc being supposed purer than calamine stone. There is little advantage, however, in the substitution of the more expensive oxide. Sometimes it is applied in ophthalmia.

UNGUENTUM OXIDI ZINCI IMPURI. Ointment of Impure Oxide of Zinc. Ed.

"Take of Simple Liniment, five parts; Prepared Impure Oxide of Zinc, one part. Mix thoroughly."

THIS has been used as an application in chronic ophthalmia, but it appears to have no particular virtue.

UNGUENTUM SULPHURIS. Ointment of Sulphur. Ed. Dub.

"Take of Hogs Lard, four parts, (pounds, Dub.); Sublimed Sulphur, one part, (pound, Dub.). Mix thoroughly, (having rubbed the sulphur into fine powder, Dub.)

UNGUENTUM SULPHURIS. Sulphur Ointment. Lond.

"Take of Sublimed Sulphur, three ounces; Prepared Lard, half a pound. Mix them."

SULPHUR is applied under this form as a certain remedy in psora, the surface affected with the eruption being rubbed with the ointment. Three ounces of the ointment may be used at each application.

UNGUENTUM SULPHURIS COMPOSITUM. Compound Sulphur Ointment. Lond.

"Take of Sublimed Sulphur, half a pound; Root of White Hellebore in powder, two ounces; Nitrate of Potash, a drachm; Soft Soap, half a pound; Prepared Lard, a pound and a half. Mix."

WHITE hellebore root has been applied with advantage in psora, and this compound ointment is often successful in cases where the simple sulphur ointment is slow in its operation.

UNGUENTUM TARTARI EMETICI. Ointment of Tartar Emetic. Dub.

"Take of Tartrate of Antimony and Potash, a drachm; Prepared Hogs Lard, an ounce. Reduce the tartrate to very fine powder, and mix it with the lard."

THIS ointment, lately introduced into the Dublin Pharmacopœia, has come into very general use as a counter-stimulant, and is often productive of much benefit. In making it, the salt should be in very fine powder, otherwise it acts slowly; the proportion of the salt may also be doubled with advantage. The ointment being white, has sometimes, as Dr. Montgomery informs us, been mistaken for simple ointment, to prevent which some colouring matter should be added. In the formula given by Dr. Jenner, four drachms of Spermaceti ointment, two drachms of Tartar emetic, one drachm of White Sugar, and five grains of Cinnabar were mixed together. Ointment of tartar emetic is applied by friction on the skin, from half a drachm to a drachm being rubbed in once or twice a day: it produces an eruption of broad flat pustules, very painful, and which originating from a deep-seated diseased action of the skin, have a powerful counter-irritant effect; if they become too painful, relief may be obtained by applying a simple poultice. The ointment was first used in hooping cough, being rubbed on the chest: the use of it has since been extended to hydrocephalus, inflammation of the liver, and pulmonary diseases; and, rubbed on the spine, it has proved beneficial in tetanus, chorea and epilepsy.

UNGUENTUM ELEMI COMPOSITUM. Compound Ointment of Elemi. Lond.

"Take of Elemi, one pound; Common Turpentine, ten ounces; Prepared Suet, two pounds; Olive Oil, two fluid-ounces. Melt the elemi with the suet, and having removed them from the fire, mix them immediately with the turpentine and oil; then strain through linen."

UNGUENTUM ELEMI. Elemi Ointment. Dub.

"Take of the Resin of Elemi, a pound; White Wax, half a pound; Prepared Hogs Lard, four pounds. Form an ointment, which strain, while warm, through a sieve."

THIS ointment is moderately stimulating, somewhat similar to the resinous ointment, and is applied to the same purpose, that of exciting suppuration from an ulcer.

UNGUENTUM SAMBUCI. Ointment of Elder. Lond.

"Take of the Flowers of Elder, Prepared Lard, of each two pounds. Boil the flowers of elder with the lard until they become friable; then strain through linen."

UNGUENTUM SAMBUCI. Ointment of Elder. Dub.

"Take of the fresh Leaves of Elder, three pounds; Prepared Hogs Lard, four pounds; Prepared Mutton Suet, two pounds. Form an ointment in the same manner as the ointment of savine."

THE elder flowers communicate to the unctuous matter a rich green colour. Ointments and plasters thus coloured by different herbs were formerly in use; but they have been discarded as possessed of no useful quality, and as the easier mode of giving them a colour, by the addition of some green pigment, came to be substituted in the shops, instead of boiling the unctuous matter with the fresh vegetable. The discovery, however, in many plants, of active principles which are soluble in oil, renders it probable that such preparations may be of more value than they have commonly been considered.

UNGUENTUM SCROPHULARIÆ. Ointment of Scrophularia. Dub.

"Take of the fresh Leaves of Scrophularia, Prepared Hogs Lard, of each two pounds; Prepared Mutton Suet, one pound. Boil the leaves in the fat until they become crisp, and strain by expression."

THE Scrophularia nodosa (a plant of the class Didynamia, Ord. Angiospermia, Nat. Ord. Scrophulariæ,) has been introduced into the Dublin Pharmacopœia, to be used in preparing this ointment, which has been found useful in Ireland, as Dr. Montgomery informs us, in tinea capitis, impetigo, and several other cutaneous affections, but more especially as a remedy for a malignant disease to which children are liable, termed "burnt holes." Dr. Whitely Stokes has described the disease, and the mode of cure, in the Dublin Medical Essays.

UNGUENTUM VERATRI. Ointment of White Hellebore. Lond.

"Take of White Hellebore rubbed to powder, two ounces; Prepared Hogs Lard, eight ounces; Oil of Lemon, twenty minims. Mix them."

Unguentum veratri albi. Ointment of White Hellebore. Dub.

"Take of White Hellebore Root in powder, three ounces; Prepared Hogs Lard, a pound. Form an ointment."

Hellebore is used, under this form, as an application to psora. It proves sometimes effectual, and is less disagreeable than the application of the sulphur ointment. It should be used, however, with caution, as its principle, *veratria*, is one of much activity.

Ceratum saponis. Cerate of Soap. Lond.

"Take of Hard Soap, eight ounces; Yellow Wax, ten ounces; Semivitrified Oxide of Lead in powder, one pound; Olive Oil, one pint; Vinegar, one gallon. Boil the vinegar with the oxide of lead on a slow fire, stirring constantly until they unite together; then add the soap, and again boil in a similar manner until the water is entirely dissipated; lastly, mix with these the wax previously melted with the oil."

This composition must derive any efficacy it has from the acetate of lead, formed by the boiling of the vinegar on the litharge, and it appears to be an operose process to obtain a composition which has no particular advantage. It is possible, also, that part of the soap and acetate of lead may decompose each other, forming acetate of potash, oxide of lead, and oil. It has been used as a plaster to fractured limbs, being supposed to have the advantage of acting also as a saturnine application. It is sometimes used for softening corns.

Unguentum piperis nigri. Ointment of Black Pepper. Dub.

"Take of Prepared Hogs Lard, one pound; Black Pepper rubbed to powder, four ounces. Form them into an ointment."

This must form a very stimulating ointment. For what purpose it is designed is not very obvious.

Linimentum hydrargyri. Liniment of Quicksilver. Lond.

"Take of the Strong Mercurial Ointment, Prepared Lard, each four ounces; Camphor, one ounce; Rectified Spirit, fifteen minims; Water of Ammonia, four fluid-ounces. Rub the camphor, first with the spirit, then with the lard and mercurial ointment: lastly, adding gradually the water of ammonia, mix the whole together."

This is designed as a stimulating application and discutient, to be applied to indolent tumours or collections of fluid; by its stimulant action it may promote absorption, and the mercury introduced by the friction may exert a more permanent action.

Linimentum terebinthinæ. Turpentine Liniment. Lond. Dub.

"Take of the Resin Cerate, a pound; Oil of Turpentine, half a pint. To the melted cerate add the oil of turpentine, and mix them together."

Oil of turpentine has been found to be a successful application to burns, and this liniment is a form under which it has been used. It is applied also to parts affected with rheumatism, and to strained joints, and is used hot as a stimulating application to sphacelating sores.

# CHAP. XXXI.

## EMPLASTRA—PLASTERS.

Plasters are of similar composition to ointments, but differ from them in their much firmer consistence, which is such, that they do not adhere to the hand. They owe this consistence, in general, to a larger proportion of wax, or sometimes to the addition of certain metallic oxides, particularly those of lead, which unite chemically with the unctuous matter. They require to be heated, in order to be spread : hence they adhere more firmly, and several of them even afford a mechanical support. They are employed generally to answer the same indications as ointments. The same rules are to be observed in their preparation as in that of Ointments.

Emplastrum simplex. Simple Plaster. Ed.

"Take of Yellow Wax, three parts ; Mutton Suet, White Resin, of each two parts. Melt with a gentle heat, and stir until the mixture cools."

Emplastrum ceræ. Wax Plaster. Lond.

"Take of Yellow Wax, Prepared Tallow, each three pounds ; Yellow Resin, a pound. Melt them together, and strain."

The principal use of this plaster is as a dressing to the surface to which a blister has been applied, after the vesicle has been cut. It is spread thin on linen with a hot iron. As the resin is rather irritating, it has been recommended to omit it when the plaster is intended for this use.

Emplastrum oxidi plumbi semivitrei. Plaster of Oxide of Lead. Ed.

"Take of the Semivitreous Oxide of Lead, one part ; Olive Oil, two parts ; Water, as much as may be necessary. Digest, stirring constantly, until the oil and the oxide unite into a plaster."

Emplastrum plumbi. Plaster of Lead. Lond.

"Take of Semivitreous Oxide of Lead, rubbed into a fine powder, five pounds ; Olive Oil, a gallon ; Water, two pints. Boil them with a slow fire, stirring constantly, until the oil and the oxide of lead pass into the consistence of a plaster. It is necessary to add a little boiling water, if the water added in the beginning be evaporated before the end of the boiling."

Emplastrum lithargyri. Litharge Plaster. Dub.

"Take of Litharge in fine powder, five pounds ; Olive Oil, a gallon ; Boiling Water, two pints. Mix them together, by stirring at a heat between 200° and 212°, until the oil and the litharge unite into a plaster, supplying occasionally water in fresh quantities as it evaporates."

This, which has been long known by the name of Diachylon, is a chemical combination of the expressed oil with the protoxide of

lead, and is of a consistence sufficiently hard to form a plaster. There is considerable attention requisite in preparing it, particularly in stirring it constantly to promote the combination, and allow of the escape of the watery vapour. If the water is dissipated before the combination is complete, an additional portion must be added, taking care to add it hot. The use of the water, it is commonly supposed, is to prevent the heat from rising too high. This notion, however, would seem to be an erroneous one; for it has been ascertained by experiment, (Quart. Journ. of Science, vol. xx. p. 400,) that oil and litharge, mixed without water, and heated by means of steam, may be kept for hours at the temperature of 220°, and constantly stirred without combining, but whenever water is added they enter into complete union. It would appear, therefore, that the water exerts a chemical action, and, it is probable, combines with the oxide, forming a hydrate, which then unites with the oil. The plaster is used, spread on leather or linen, as an application to excoriations, or slight wounds.

Emplastrum resinosum. Resinous Plaster. Ed.

"Take of Plaster of Semivitreous Oxide of Lead, five parts; Resin, one part. Melt with a gentle heat, and continue stirring until the mixture cools and stiffens."

Emplastrum resinæ. Resin Plaster. Lond.

"Take of Yellow Resin, half a pound; Plaster of Lead, three pounds. To the plaster of lead melted with a slow fire add the resin bruised, and mix them."

Emplastrum lithargyri cum resina. Litharge Plaster with Resin. Dub.

"Take of Litharge Plaster, three pounds and a half; Yellow Resin, half a pound. To the litharge plaster melted with a moderate heat, add the resin beat to a fine powder, that it may melt speedily, and form a plaster."

The plaster of litharge is rendered more adhesive, and somewhat more stimulating, by this intermixture of resin. It is found highly useful in contracting the size of ulcers, according to the method of Mr. Baynton.

Emplastrum oxidi ferri rubri. Plaster of Red Oxide of Iron. Ed.

"Take of Plaster of Semivitreous Oxide of Lead, twenty-four parts; White Resin, six parts; Yellow Wax, Olive Oil, of each three parts; Red Oxide of Iron, in powder, eight parts. Rub the red oxide of iron with the oil, and add it to the other ingredients melted, then mix all thoroughly."

Emplastrum thuris. Plaster of Frankincense. Dub.

"Take of Litharge Plaster, two pounds; Frankincense, half a pound; Red Oxide of Iron, three ounces. Sprinkle the oxide into the plaster and the frankincense melted together, stirring them together, and form a plaster."

These plasters, spread on leather, are sometimes used as an application in slight cases of lumbago, and give some relief, by affording a mechanical support.

EMPLASTRUM ASSÆFŒTIDÆ. Assafœtida Plaster. Ed.

"Take of Plaster of Semivitreous Oxide of Lead, Assafœtida, of each two parts; Resin of Galbanum, Yellow Wax, of each one part. Add the resins, after being melted and strained, to the plaster and wax while melted, and mix them all thoroughly."

THIS plaster is sometimes applied to the breast or side in hysteric affections, but probably with little advantage.

EMPLASTRUM AMMONIACI. Ammoniac Plaster. Ed. Lond.

"Take of Ammoniac, five parts, (ounces, Lond.); Weak Acetic Acid, eight parts, (half a pint, Lond.) Dissolve the ammonia in the acid, then evaporate the liquor in an iron vessel by the heat of a water-bath, stirring it until it obtain a proper consistence."

EMPLASTRUM AMMONIACI. Ammoniac Plaster. Dub.

"Take of Ammoniac, purified, five ounces; Vinegar of Squills, half a pound. Dissolve the ammoniac in the vinegar; then evaporate the liquor by heat, stirring it until it attain a proper consistence."

UNDER this form, gum-ammoniac is applied as a discutient, and sometimes also as a remedy in tinea capitis; it is sometimes too stimulating, and produces an eruption.

EMPLASTRUM AMMONIACI CUM HYDRARGYRO. Plaster of Ammoniac with Quicksilver. Lond.

"Take of Purified Ammoniac, one pound; Purified Quicksilver, three ounces; Sulphuretted Oil, one fluid-drachm. Rub the quicksilver with the sulphuretted oil until the globules disappear; then add gradually the ammoniac melted, and mix them."

EMPLASTRUM AMMONIACI CUM HYDRARGYRO. Plaster of Ammoniac with Quicksilver. Dub.

"Take of Pure Gum-Ammoniac, a pound; Purified Quicksilver, three ounces; Common Turpentine, two drachms. Rub the quicksilver with the turpentine until the globules disappear, then add gradually the ammoniac melted, and melt them together."

THIS is similar to the simple mercurial plaster, and its discutient and stimulant powers are perhaps promoted by the ammoniac. The sulphuretted oil, which is used to extinguish the mercury, renders the plaster offensive, and turpentine is preferable. The mercury is sometimes introduced into the system by the use of the plaster.

EMPLASTRUM BELLADONNÆ. Plaster of Belladonna. Dub.

"Take of the Inspissated Juice of Belladonna, an ounce; Soap Plaster, two ounces. Make a plaster."

A plaster of belladonna has been found serviceable in relieving neuralgia and chronic rheumatism, but this does not appear to be the best form of it. Dr. Duncan recommends the powdered leaves to be used rather than the watery juice, which is weaker, and does not unite so perfectly with the resinous matter of the plaster, or to boil the leaves in the melted ointment till they become crisp, and strain with expression, as in making elder ointment.

EMPLASTRUM GUMMOSUM. Gum Plaster. Ed.

"Take of Plaster of Semivitreous Oxide of Lead, eight parts; Gum-Resin of Ammoniac, Galbanum, Yellow Wax, of each one part. After dissolving the resins and straining them, add them to the plaster and wax melted, and mix thoroughly."

EMPLASTRUM GALBANI. Galbanum Plaster. Dub.

"Take of Plaster of Litharge, two pounds; Galbanum, half a pound; Scrapings of Yellow Wax, four ounces. To the galbanum melted with a gentle heat, add the litharge plaster and wax, and melt them with a moderate heat."

EMPLASTRUM GALBANI COMPOSITUM. Compound Galbanum Plaster. Lond.

"Take of Galbanum, purified, eight ounces; Plaster of Lead, three pounds; Common Turpentine, ten drachms; Resin of the Spruce Fir in powder, three ounces. To the galbanum and turpentine previously melted together, add first the resin, then the plaster of lead, melted with a slow fire, and mix them."

THESE three plasters are essentially the same. They are employed as discutient applications to indolent tumours, sometimes to promote suppuration of abscesses, and are said to be useful applied over the lumbar region of rickety children.

EMPLASTRUM OPII. Opium Plaster. Lond.

"Take of Hard Opium in powder, half an ounce; Resin of the Spruce Fir bruised, three ounces; Plaster of Lead, a pound; Water, half a pint. To the plaster melted, add the resin, opium, and water, and evaporate by a slow fire until the whole unite into the consistency of a plaster."

EMPLASTRUM OPII. Opium Plaster. Ed. Dub.

"Take of Opium, reduced to powder, half an ounce; Burgundy Pitch, three ounces; Litharge Plaster, a pound. Add the opium and pitch to the melted plaster, and mix them thoroughly."

OPIUM has been used as an anodyne, by external application, with advantage, as, for example, in relieving toothach. This plaster is designed to afford a form of applying it; but the usual mode of extending a piece of soft opium on leather or silk is to be preferred, as more effectual.

EMPLASTRUM HYDRARGYRI. Quicksilver Plaster. Ed.

"Take of Olive Oil, White Resin, of each one part; Purified Quicksilver, three parts; Plaster of Semivitreous Oxide of Lead, six parts. Rub the quicksilver with the oil and resin melted together, and then cooled, until the globules disappear; then add gradually the plaster of semivitreous oxide of lead, melted, and mix the whole carefully."

EMPLASTRUM HYDRARGYRI. Quicksilver Plaster. Lond.

"Take of Purified Quicksilver, three ounces; Sulphuretted Oil, a drachm; Plaster of Lead, a pound. Rub the quicksilver with the sulphuretted oil until the globules disappear, then add gradually the plaster of lead, melted, and mix them."

THE sulphuretted oil in the latter formula causes the mercury to lose the form of globules more quickly, and thus abridges the labour of the preparation; but it may be doubted if the quicksilver thus ex-

tinguished is in the same state of activity as when this has been done by trituration with unctuous matter alone. The mercurial plaster is applied as a discutient to indolent tumours; and it has been supposed, that from its continued application, the mercury will be absorbed, and act locally in glandular affections.

EMPLASTRUM SAPONACEUM. Soap Plaster. Ed.

"Take of Plaster of Semivitreous Oxide of Lead, four parts; Gum Plaster, two parts; Hard Soap sliced, one part. Mix the soap with the plasters melted together; then boil a little, so as to form a plaster."

EMPLASTRUM SAPONIS. Soap Plaster. Lond. Dub.

"Take of Hard Soap, cut down, half a pound; Plaster of Lead, three pounds. Mix the soap with the plaster melted, then boil for a little."

THIS has been supposed to possess a discutient quality; but it is much inferior to the mercurial plaster, and is scarcely ever used. The quantity of soap is too large.

EMPLASTRUM SAPONIS COMPOSITUM VEL ADHÆRENS. Compound Soap Plaster, or Adhesive Plaster. Dub.

"Take of Soap Plaster, two ounces; Litharge Plaster with resin, three ounces. Make a plaster, which is to be spread melted upon linen."

THIS plaster, lately introduced into the Dublin Pharmacopœia, is the common adhesive plaster which is made on the large scale, and spread on linen by machinery. It combines the adhesion of the resin with the pliability of the soap plaster.

EMPLASTRUM CANTHARIDIS VESICATORIÆ. Plaster of Cantharides. Ed.

"Take of Cantharides, rubbed into a fine powder, White Resin, Yellow Wax, Mutton Suet, of each equal weights. Mix the cantharides with the other ingredients, melted together, and removed from the fire; and agitate continually until the mixture hardens."

EMPLASTRUM CANTHARIDIS. Plaster of Cantharides. Lond.

"Take of Cantharides, rubbed to a very fine powder, a pound; Wax Plaster, a pound and a half; Prepared Lard, half a pound. Sprinkle in the cantharides to the plaster and lard melted together, and removed from the fire a little before they become solid, and mix the whole together."

EMPLASTRUM CANTHARIDIS. Cantharides Plaster. Dub.

"Take of Cantharides in very fine powder, Yellow Wax, each a pound; Yellow Resin, four ounces; Mutton Suet, Hogs Lard, each half a pound. Sprinkle the cantharides into the wax, tallow and resin melted together, a little before they become solid from cooling, and mix them so as to form a plaster."

THIS is the common *Blistering Plaster*. It is of a softer consistence than the other plasters, that it may admit of being spread without the assistance of heat, which would impair the acrid quality of the cantharides. It is spread on leather, and requires to be applied

twelve hours to produce a perfect blister; it is then removed; the vesicle is cut, and the inflamed surface is dressed with simple cerate or plaster. In cases where it is of importance that a blister should be raised with certainty, and speedily, it is of advantage to sprinkle a little of the powder of cantharides on the surface of the plaster when spread. Washing the part previously with vinegar is also useful to insure the effect. Camphor is sometimes mixed with the blistering composition, on the supposition that it prevents the strangury, which is sometimes produced by a large blister; but it appears to have no such virtue, and this painful symptom is more effectually obviated by the free use of diluents while the blister is applied,—a practice always proper where the system is irritable, or even in common cases where the blister is large. The skin should be clean on which the blister is put, otherwise it leaves a permanent stain; to prevent this, it is also proper not to dress the blistered surface with highly coloured ointments. Dr. Montgomery remarks that children are often injured by blisters being applied for too long a time, and that they should not be kept on longer than three or four hours, whether vesication has been produced or not.

EMPLASTRUM CANTHARIDIS VESICATORIÆ COMPOSITUM. Compound Plaster of Cantharides. Ed.

"Take of Venice Turpentine, eighteen parts; Burgundy Pitch, Cantharides, of each twelve parts; Yellow Wax, four parts; Subacetate of Copper, two parts; Mustard Seed, Black Pepper, of each one part. To the Burgundy pitch and wax melted, add the turpentine. While these are melted and still warm, add the other ingredients, mixed and rubbed to a fine powder, stirring constantly, until the mixture become cold and hard."

IT occasionally happens, that the common plaster of cantharides is insufficient to excite a blister, even when its surface has been sprinkled over with powdered cantharides. In such cases, or even in others where it is necessary that a blister should be quickly raised, and where the system is not easily affected, as in comatose diseases, this more powerful composition may be employed. Its operation is accompanied with a very pungent sensation of heat. The application of it ought not to be continued too long, as it might induce ulceration; and from the greater acrimony of this than of the common epispastic, still more precaution ought to be taken against the occurrence of strangury.

EMPLASTRUM CUMINI. Cumin Plaster. Lond.

"Take of Cumin Seeds, Caraway Seeds, Bay Berries, of each three ounces; Burgundy Pitch, three pounds; Yellow Wax, three ounces; Olive Oil, Water, of each an ounce and a half. To the pitch and wax melted, add the dry ingredients in powder, and then the olive oil and water; lastly, evaporate until the whole acquire a proper consistence."

THIS has been applied to the region of the stomach as a moderate stimulant in hysteric affections and flatulent colic, but it cannot be supposed to be of much advantage.

Emplastrum picis compositum. Compound Pitch Plaster. Lond.

"Take of Burgundy Pitch, two pounds; Resin of the Spruce Fir, one pound; Yellow Resin, Yellow Wax, of each four ounces; Expressed Oil of Nutmeg, one ounce; Olive Oil, Water, of each two fluid-ounces. To the pitch, resin and wax, melted together, add first the resin of the spruce fir, then the oil of nutmegs, the olive oil, and the water. Lastly, mix them all, and evaporate to a proper thickness."

Burgundy pitch is in common use as a rubefacient, under the form of plaster. The addition of the other ingredients of this compound plaster may render it rather more stimulating, and the wax gives it due tenacity.

Emplastrum calefaciens. Warm Plaster. Dub.

"Take of Plaster of Cantharides, one part; Burgundy Pitch, seven parts. Mix them melted together with a moderate heat, and form a plaster."

By the addition of this small portion of cantharides, the stimulating power of the Burgundy pitch is considerably increased. This accordingly affords a very excellent rubefacient, which is frequently employed.

Emplastrum aromaticum. Aromatic Plaster. Dub.

"Take of Frankincense, three ounces; Yellow Wax, half an ounce; Cinnamon Bark in powder, six drachms; Essential Oil of Jamaica Pepper, Essential Oil of Lemons, of each two drachms. Melt the frankincense and wax together, and strain. As they thicken on cooling, mix in the powder of cinnamon, rubbed with the oils, and form a plaster."

This is designed as a stomachic plaster, being applied to the region of the stomach, in some forms of dyspepsia. It ought to be always extemporaneously prepared, as the essential oils are soon volatilized.

## CATAPLASMATA—CATAPLASMS.

Pulvis pro cataplasmate. Powder for a Cataplasm. Dub.

"Take of Lintseed Oil-cake, one part; Oatmeal, two parts. Mix."

Cataplasma simplex. Simple Cataplasm. Dub.

"Take of the powder for a Cataplasm, any quantity; Boiling Water, enough to form a tepid cataplasm, which is to be smeared over with olive oil."

This appears to be a good method of forming a useful cataplasm. The basis is the cake which remains after the expression of lintseed oil, and which always continues soft and unctuous. The cataplasm is applied warm as an emolient, and should be often renewed.

Cataplasma aluminis. Alum Cataplasm. Dub.

"Take the Whites of two Eggs; Alum, a drachm. Shake them together, so as to form a coagulum."

It is used as an astringent application to the eye in chronic and purulent ophthalmia, inclosed between two folds of very fine linen; likewise to chilblains.

Cataplasma carbonis ligni. Charcoal Cataplasm. Dub.

"Take of Charcoal red hot from the fire, and extinguished by pouring dry sand upon it, a sufficient quantity: reduce it to very fine powder, and add it to the simple cataplasm warm."

Charcoal recently prepared has a remarkable power of removing offensive odours, and is also a powerful antiseptic. Accordingly, this poultice is applied with advantage to destroy the fetor of foul ulcers and gangrenous sores, and often renders their condition more healthy.

Cataplasma conii. Hemlock Cataplasm. Dub.

"Take of dry Hemlock Leaves, an ounce; Water, a pint and a half. Boil down to a pint, and add as much of powdered hemlock leaves as is sufficient to form a cataplasm."

The formula is deficient in not stating the additional quantity of hemlock that is to be employed; the poultice is often thickened with lintseed meal, or is made with the fresh bruised leaves. It is an excellent anodyne application in cancer and malignant sores, and has sometimes improved their appearance.

Cataplasma dauci. Carrot Cataplasm. Dub.

"Take of the Root of the cultivated Carrot, any quantity. Boil it in water till it becomes soft enough to form a cataplasm."

The root, when boiled, is beaten to a pulp, and pressed through a hair-sieve. It is emollient, and is also supposed to be antiseptic, and to improve ulcers.

Cataplasma fermenti. Yeast Cataplasm. Lond. Dub.

"Take of Flour, a pound; Yeast of Beer, half a pint. Mix and apply a gentle heat, until the mixture begins to rise."

The yeast, mixed with the flour, and aided by the heat, soon excites fermentation, and the cataplasm in this state has been applied with advantage as an anodyne in painful and irritable sores, and as an antiseptic in ulceration, attended with fetor. Its efficacy depends on the carbonic acid evolved by the fermentative process.

Cataplasma sinapis. Mustard Cataplasm. Lond. Dub.

"Take of Mustard Seeds, Lintseed, of each in powder, half a pound; Vinegar, warm, as much as is sufficient. Mix, so as to obtain the consistence of a cataplasm. (It may be made more stimulating, by adding two ounces of the scrapings of horse radish, Dub.)"

The Mustard Cataplasm, or Sinapism, is the composition usually applied as a stimulant to the soles of the feet in typhus, where there is determination to the head, and in comatose affections. It acts as a powerful rubefacient; its action is attended with a sense of heat and pain, which soon become urgent, and hence, in a state of coma, the application ought not to be continued too long. It operates on the same principle as a blister, and differs principally in its effects being more quickly obtained, and being more powerfully stimulant to the general system, without producing the same superficial inflammation.

# APPENDIX.

Under this Appendix I have placed some subjects connected with Materia Medica and Pharmacy, which could not otherwise be arranged with equal advantage. Mineral Waters are complicated in their composition, and according to the substances they contain produce different effects on the system. They are therefore employed to answer different indications; and are hence not easily arranged under the classes of the Materia Medica, when these are established on analogies in medicinal operation. The same remarks apply to the Gases which have been used as remedies. I have added a few observations on the medical employment of Electricity and Galvanism, to complete the view of what properly belongs to Materia Medica; and as connected with the subject, I have subjoined a few observations on the doses of medicines, and the rules that regulate extemporaneous prescription.

Of mineral waters.—Waters which flow at the surface of the earth are frequently impregnated with foreign matter, so as to acquire taste and odour, and to be capable of producing changes in the state of the living system. Such waters are denominated Mineral, it being usually matter belonging to the mineral kingdom which communicates these powers.

Important medicinal effects are frequently obtained from mineral waters, arising primarily from the operation of the substances which they hold dissolved, though this is aided by the state of dilution, the action of the water itself as a diluent, and by other external circumstances. The chemical composition, therefore, of these waters, is of importance, as determining the principles in which their active powers reside, and thus enabling the physician to employ them with more advantage and discrimination.

Mineral waters, both in a chemical classification, and in relation to their medicinal use, may be arranged under four orders: Carbonated mineral waters, or those impregnated with carbonic acid gas; Sulphureous mineral waters, or those impregnated with sulphuretted hydrogen; Saline mineral waters, or those which hold certain neutral salts in solution; and Chalybeate mineral waters, or those, the properties of which depend on an impregnation of iron. These indeed are not perfectly insulated, but, in general, those of one division have a relation to those of the others, by being likewise impregnated with one or other of the ingredients which these contain. But still each may be classed according to its predominant ingredient, or that which gives it its most characteristic chemical and medicinal powers.

It would be foreign to the object of this outline, to give the details connected with the analysis of mineral waters*. I shall merely point out briefly their medicinal applications.

I. Carbonated mineral waters.—The waters referred to this class are those which contain carbonic acid gas. To bring them under the appellation of mineral waters, however, this must be present in such quantity as to communicate certain sensible qualities. Waters impregnated with free carbonic acid gas sparkle when drawn from the spring, or when poured into a glass; they have a taste pungent and acidulous, but become vapid from exposure to the air. They redden litmus, but the effect is evanescent. Lime water added to them throws down a precipitate of carbonate of lime. Along with the carbonic acid there are generally present portions

* For an account of the methods of detecting and estimating the ingredients of Mineral Waters, I may refer to Dr. Murray's System of Chemistry, vol. iii. fourth edition, to the last edition which I published of his Elements of Chemistry, or the Edinburgh Transactions, vol. vii. and viii, in which his views of the distribution of these ingredients are stated, and a General Formula is given for the analysis of all Mineral Waters.—*Ed.*

of saline, earthy or metallic matter, chiefly carbonates and sulphates of lime and magnesia, muriate of soda, and oxide of iron, or in the view which has appeared to me the more probable one, of carbonate and sulphate of soda, and muriates of lime and magnesia.

Waters highly impregnated with carbonic acid gas are grateful from their pungency, sit light on the stomach, and in a large dose produce a sensible degree of exhilaration; they increase the appetite, and generally have a diuretic effect. They prove useful in dyspeptic affections, from the grateful and moderate stimulus exerted by the carbonic acid on the stomach, aided by the diluent operation of the water, and hence the advantage derived from them in the numerous chronic affections connected with impaired power of the digestive organs, and particularly in simple dyspepsia, in hypochondriasis and gout. They generally also contain some saline substances, which communicate additional powers, and the operation of these is promoted, or at least they are rendered more grateful by the carbonic acid. Those which contain carbonate of soda, as Seltzer water, prove more powerfully diuretic, and are employed with advantage as palliatives in urinary calculus, and in the painful discharge of urine from other affections of the urinary organs. Some of the most celebrated mineral waters of Europe belong to this class, such as the Spa, Pyrmont, and Seltzer water. Their analysis will be found in the table at the end of this article. None of the mineral springs of this country are much impregnated with carbonic acid; and those which contain it, as the waters of Bristol and Cheltenham, derive more activity from the presence of other substances.

II. Sulphureous mineral waters.—These waters owe their distinguishing characters to an impregnation of sulphuretted hydrogen, and are at once recognised by their peculiar fetid smell. They are transparent when drawn from the spring, but become turbid from exposure to the air, and gradually lose their odour. When strongly impregnated, they redden infusion of litmus, and in their weakest state give a dark precipitate with solution of nitrate of silver, or acetate of lead, and tarnish the metals.

The sulphureous mineral waters usually contain saline substances, which modify their powers. From the action of the sulphuretted hydrogen, they are employed in cutaneous affections; and from the combined action of this and the saline matter, which generally has a purgative effect, they are farther used in diseases of the digestive organs, dyspepsia, hypochondriasis, torpor of the intestines, visceral obstructions, and in scrofulous affections. They are also applied externally in cutaneous eruptions; and the warm sulphureous baths have been in particular celebrated for their efficacy under this form of application. The principal sulphureous mineral waters of this country are those of Harrowgate and Moffat; the former have a large proportion of saline matter, muriates and carbonates. Those celebrated on the Continent are chiefly the warm sulphureous springs of Aix-la-Chapelle and Barêge.

III. Saline mineral waters.—Under this class are comprised those waters, in which, without any large proportion of aërial matter, various saline compounds, generally neutral, exist. The salts usually present are sulphates, muriates*, and carbonates: and the bases with which the acids forming these are combined, are soda, magnesia, and lime. Their analysis is accomplished, first, by detecting, by the employment of tests, the acids present, and the bases by which these are neutralized; and, secondly, obtaining either the salts themselves, or their elements, by evaporation, or by the action of certain re-agents.

*Sulphuric Acid* is detected by a solution of nitrate or muriate of barytes, which throws down a white precipitate of sulphate of barytes, and will do so when there is present not more than a grain of sulphuric acid in 48,000 grains of water; the precipitate is not soluble in nitric acid. *Muriatic Acid* is detected in a similar manner, and with equal delicacy, by nitrate of silver, which forms a bluish white precipitate of chloride of silver. *Carbonic Acid*, by muriate of barytes, the precipitate being dissolved with effervescence by nitric acid. *Lime* is precipitated by oxalate of ammonia, and *Magnesia* by adding first carbonate of ammonia, and then phosphate of ammonia. *Soda* is not precipitated by any re-agent; but after the other ingredients are removed, it may be obtained in combination with muriatic acid, in crystals, by evaporation.

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* These are, according to the present views of the nature of muriatic acid, metallic chlorides when in their dry state; but the term of muriates is correct, when applied to them in their state of solution in mineral waters.

Besides the methods of discovering the saline ingredients in mineral waters by reagents, which indicate their principles, they may be obtained in their entire state, and their quantities determined. Evaporation is employed with this view, different substances being successively obtained as the evaporation is carried to a greater or less extent. Thus, the carbonates of lime and magnesia are usually first precipitated, afterwards sulphate of lime falls down: if after these precipitations the liquor be drawn off and allowed to cool, the alkaline neutral salt and the sulphate of magnesia crystallize, while muriate of magnesia and muriate of lime, if present, remain, forming an uncrystallizable residue.

Alcohol facilitates the analysis by a similar operation. When added to the water brought to a certain state of concentration, it throws down first sulphate of lime, afterwards carbonate of lime and carbonate of magnesia; and if added in larger quantity, or after a renewed evaporation, it either precipitates or causes to crystallize sulphate of magnesia and sulphate of soda, while any muriates remain dissolved. Advantage, too, is taken of its solvent power, the solid substances being obtained by evaporation to dryness, and their separation being facilitated by the addition of alcohol in successive portions. By these methods of evaporation and precipitation the ingredients of Mineral Waters are determined, and their quantities estimated.

The substances obtained by evaporation, or by these analytic methods, have always been considered as the ingredients of the mineral water. There can be no doubt, however, but that the state of combination is often liable to be changed by the analytic process, and that the substances obtained are, from this cause, sometimes products of the operation, and not original ingredients. The importance of this in determining the composition of mineral waters, and in explaining the source of their medicinal powers, first occurred to me in conducting the analysis of a mineral water, (that of Dumblane,) which afforded, by evaporation, muriate of soda, muriate of lime, and sulphate of lime. These, according to the conclusions generally drawn, would have been considered as the real ingredients; but without any just proof; for it is equally possible that the sulphuric acid might exist in the water in the state of sulphate of soda, and that, during the evaporation, this acting on a portion of the muriate of lime, might form muriate of soda, and sulphate of lime. Various considerations rendered this even the more probable conclusion, as I have stated in a Memoir on this subject, (Edinburgh Philosophical Transactions, vol. vii.); and in all cases in which muriate of soda and sulphate of lime are obtained from a mineral water by evaporation, or by any analogous analytic operation, the portions of them equivalent to each other are to be regarded as products of such a decomposition. A similar conclusion may be drawn, where carbonate of lime or carbonate of magnesia is obtained, if muriate of soda is obtained along with them. The quantities of them equivalent to the proportional quantity of muriate of soda may be regarded as products of the action of carbonate of soda on muriate of magnesia and muriate of lime; and the same view may sometimes even be applied to the production of sulphate of magnesia. Thus, the real composition of a saline mineral water will often be very different from that directly inferred from the products of its analysis.

This view often leads to a satisfactory explanation of the medicinal powers of mineral waters, which, on the common doctrine, are very imperfectly accounted for. No better example can be given to illustrate this, than the celebrated Bath water. It contains in a pint 9 grains of sulphate of lime, 3.3 grains of muriate of soda, with a little muriate of magnesia, 1.5 grains of sulphate of soda, 0.4 of carbonate of lime, 0.2 of silica, and 0.016 of oxide of iron,— substances either so inert, or in such minute quantities, that no sensible effect could be expected from them. But if we adopt the opposite view, the real ingredients, instead of sulphate of lime and muriate of soda, are 5.5 grains of sulphate of soda, and 3.5 grains of muriates of lime and magnesia, a composition much more active, and accounting better for the medicinal powers. Seltzer water affords another striking example of a similar kind. Along with a large impregnation of carbonic acid, it contains, according to Bergman, in a pint, 3 grains of carbonate of lime, 5 grains carbonate of magnesia, 4 grains carbonate of soda, 17.5 muriate of soda. But the real composition, according to the preceding view, is 3.3 grains of muriate of lime, 5 grains muriate of magnesia, 7.8 grains muriate of soda, and 18 grains carbonate of soda,—a composition totally different from the former, and approaching much more to what is to be expected from the great activity of this mineral water.

Thus, the composition of saline mineral waters is often very different from what would be inferred, if the substances obtained by their analysis were to be regarded as the real ingredients. Some have supposed that no binary salts exist together in solution in water, but that, in such cases, only one combination, properly speaking,

exists, formed by the simultaneous union and mutual neutralization of the different acids and bases present. It is more probable, however, that binary combinations exist; and it is only necessary to guard against the error of supposing that they are necessarily those afforded by the analysis.

Saline Mineral Waters are usually aperient, the substances which they hold dissolved being either, so far as can be determined, inert, such as the sulphate and carbonate of lime, or being cathartic, as the greater number of the other compound salts. It has always been remarked, with regard to them, that their cathartic power is greater than could be supposed from the extent of their saline impregnation, as determined by analysis;—a proof of the influence of dilution in the operation of mineral waters. They are usually employed in diseases where it is of advantage to stimulate the digestive system, the intestinal canal, and the secreting organs connected with it, or where advantage is derived from moderate and continued evacuations. Hence their celebrity in the treatment of some forms of dyspepsia and hypochondriasis, chlorosis, chronic hepatitis, jaundice, and in scrofula.

When saline waters are impregnated with carbonic acid, which they frequently are, they become more grateful, and sit easier on the stomach. When they have an impregnation of iron, they acquire tonic powers, and more efficacy as remedies in amenorrhœa, and the other chronic diseases in which this metal is employed: And the muriate of soda and muriate of lime, which some of them contain, probably render them more beneficial in scrofula and affections of the glandular system.

Sea-water, in strict chemical arrangement, must be regarded as belonging to the class of saline mineral waters, as it holds dissolved merely various neutral salts, chiefly muriate of soda and of magnesia, and sulphate of soda and magnesia, with a little sulphate of lime. It much exceeds, however, in the extent of impregnation, any common mineral water; the proportion of saline matter varies in different latitudes, according to the temperature producing greater or less evaporation; and it is liable to be varied by the discharge of large rivers into the ocean. According to the analysis which I have given of the water of the Firth of Forth, a pint of sea-water contains 226.1 grains of saline matter. The salts obtained by evaporation were, muriate of soda, 180.5 grains, muriate of magnesia, 23, sulphate of magnesia, 15.5, and sulphate of lime, 7.1 grains. But, on the view which I have suggested, these are not the salts that really exist in sea-water, but are only the products of mutual decompositions which happen when the liquor becomes concentrated. On the principle that has been stated, of arranging the elements into the most soluble salts, it is more probable that the lime and magnesia exist in combination with muriatic acid than with sulphuric acid; and supposing that the sulphuric acid is combined with soda, the proportions will be, muriate of soda, 159.3, muriate of magnesia, 35.5, muriate of lime, 5.7, and sulphate of soda, 25.6, =226.1 grains*.

The medicinal powers of sea-water are similar to those of the saline mineral waters: from the extent of its saline impregnation, it is more active as a cathartic; and it is more stimulating than fresh water as a bath.

IV. Chalybeate mineral waters.—These owe their characteristic properties, chemical and medicinal, to an impregnation of *Iron*, in the state partly of protoxide, partly of peroxide. Chalybeate waters have a peculiar styptic taste; they are transparent when taken from the spring, but, when exposed for some time to the air, a pellicle forms on the surface, and a quantity, generally minute, of ochry sediment, subsides, the water at the same time losing its taste; this change is accelerated by heat.

Iron is discovered, with great facility, by chemical tests. Prussiate of potash detects it by the blue colour to which it gives rise; tincture of galls by the purple colour which it strikes. The latter test is more delicate than the former, and it is much more accurate; the prussiate of potash being liable to fallacy, from the iron which it already contains.

Chalybeate mineral waters are remedies of considerable activity and power. They act as tonics, increasing the strength of the system, raising the force of the circula-

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* Dr. Murray found reason afterwards to conclude, that the water of the Firth of Forth, though collected at a distance from any source of fresh water, contained a less proportion of saline matter than what exists in the ocean; the influence of the fresh water from a large river extending, it would appear, farther down its estuary than could have been supposed. The proportion of saline matter in the water of the German Ocean is hence probably a little larger than what is here stated, but there is no reason to suppose that the relative quantities of the salts are different.—*Ed.*

tion, giving tone to the digestive organs, augmenting muscular vigour, and promoting the excretions. They are of course employed in those diseases in which iron is principally used, amenorrhœa, chlorosis, some states of menorrhagia, leucorrhœa, dyspepsia, scrofula, and various forms of chronic debility. And as iron succeeds best when given in small doses, and in a state of considerable dilution, the chalybeate waters afford the best form under which it can be prescribed, that which is at once attended with least irritation, and from which the greatest benefit is obtained. The powers of these waters, too, are often aided by the presence of other ingredients. The impregnation of carbonic acid, when it is present in excess, gives them a grateful stimulant quality, which is exerted on the stomach; and saline substances communicate to them an aperient power.

Besides the substances which have been enumerated as forming the preceding classes of mineral waters, there are some others of more rare occurrence, or present in smaller quantity. Atmospheric air is contained in all waters that flow at the surface of the earth, and renders it more grateful and light as drink. When substances exist in the mineral water which attract the oxygen of this air, the *Nitrogen gas* appears as a distinct ingredient, as in the waters of Harrowgate. *Sulphate of alumina* and *sulphate of iron* sometimes occur, arising probably from the oxygenation of aluminous slate, impregnated with sulphuret of iron, through which the water has passed. *Manganese*, *Silica*, *Barytes*, *Strontites*, have been discovered in minute quantities in some waters; and as chemical analysis becomes more perfect, it is to be expected that more of these accidental and local intermixtures shall be observed. Thus, in a late analysis by Berzelius of the waters of Carlsbad, he detected, besides the ingredients ascertained by Bergmann, small proportions of fluate and phosphate of lime, phosphate of alumina, carbonate of iron, carbonate of strontites, and carbonate of manganese.

The temperature of mineral waters has considerable influence on their medicinal effects. The warmth of tepid waters renders them more stimulating when they are taken, a glow being felt at the stomach, and sometimes the head is slightly affected. When externally applied under the form of the bath, the temperature has a greater share in the effect than any impregnation they may have.

The following table exhibits the composition of the more celebrated mineral waters. The quantities are those contained in a wine gallon of the water, or 58327 grains Troy of pure water at 60°. The epithet *cold* marks where the temperature of the spring is not above that of the external atmosphere; where it exceeds this the precise degrees are added.

THE view which occurred to my Father, of the real nature of mineral waters, of which a statement is given in the text, is now regarded by chemical authorities as one highly probable, and as often throwing much light on the medicinal powers of those agents. The idea that the salts obtained by evaporation of a mineral water may not, as used to be supposed, be the real ingredients that existed in it, but may be the products of decompositions, which happen in the concentration, is, when suggested, so obvious and plausible, that there is little difficulty in admitting it. And the conclusion drawn by my Father, that the *most soluble* salts are those most likely to exist in a very dilute solution, and that hence we may infer the composition of a mineral water, by arranging its elements, as detected by analysis, into the most soluble compounds, explains a number of facts which before perplexed chemists. Thus, the quantity of salts of sparing solubility obtained by evaporation of a mineral water, is sometimes greater than can be redissolved in the same bulk of pure water; indicating that the elements must have existed in the water in the state of more soluble compounds than the evaporation has produced. The fact, that the imitations of mineral waters, made by dissolving the salts obtained by analysis in a similar proportion of water, are almost always devoid of medicinal efficacy, is to be explained in the same way. Lastly, the medicinal effects of mineral waters are so similar to what are occasioned by the salts which my Father's view assigns as their constituents, viz. sulphate and carbonate of soda, and muriates of lime and magnesia, while they can be so little attributed to the carbonate and sulphate of lime, and muriate of soda, formerly believed to be their ingredients, that we can scarcely hesitate to receive the former as the true components.

An experiment which I performed seems to afford some additional evidence in favour of my Father's views. To a quantity of pure water I added a few drops of a dilute solution of muriate of lime, and afterwards a small portion of carbonate of soda; the solutions were so dilute that no precipitation happened; a blue vegetable infusion was then poured in, the colour of which was immediately changed to green

by the alkaline reaction of the carbonate of soda ; now carbonate of soda and muriate of lime are regarded as incompatible salts, and, if I had evaporated the solution, would undoubtedly, as it became concentrated, have decomposed each other, and produced carbonate of lime and muriate of soda ; but the test of the vegetable infusion shewed, that in the dilute solution the carbonate of soda and muriate of lime remained together unchanged, and renders it probable that they may in like manner co-exist in mineral waters.

To the table of the composition of mineral waters given by my Father, (and to which I have added some recent analyses,) I have subjoined another table, shewing the constitution of those waters in conformity with his views. He did not give a table of this kind, as being doubtful of the accuracy of the analyses that were then known ; but the superior accuracy which has now been attained in that branch of chemistry has supplied data more to be depended on. In particular, analyses have recently been made with much care by Dr. Scudamore of the principal mineral springs of England ; and in the greater number of these, Dr. Scudamore proceeded on the principle of analysis pointed out by my Father, arranging the elements into the most soluble and active combinations. The slightest inspection of the two tables will shew, that the second assigns to the several mineral waters a composition much more likely to give rise to medicinal efficacy than is presented in the first table.

It was mentioned that it has been found difficult to prepare imitations of mineral waters, on the principle that the salts procured by evaporation are the true constituents, these salts being usually inert, and sometimes almost insoluble. But by impregnating water with the salts inferred, on my Father's view, to exist in the mineral spring, artificial waters may be prepared very similar in properties to the natural. Dr. Murray has given the following method of preparing an artificial Seltzer water : "Pour a pint of water into a strong bottle, introduce by means of a long funnel reaching to the bottom of the bottle, 35 grains of muriatic acid, of the strength usually met with in the shops, then drop in three grains of pure white marble in coarse powder, and close the bottle ; when these are dissolved, add five grains of subcarbonate of magnesia, and afterwards 27 grains of bicarbonate of soda ; close the bottle accurately, shake and invert it : in a short time a perfect solution takes place, and a transparent liquor is obtained, which sparkles when poured out, and has a pleasant taste." In this process, by using muriatic acid, and dissolving in it the different bases combined with carbonic acid, the soluble muriates are formed in the due proportions, while the carbonic acid disengaged is retained in solution by the water, and by the slight degree of pressure from closing the bottle, and thus an artificial carbonated water is formed, of the same composition as Seltzer water. In a similar manner the other carbonated mineral waters may be imitated. Chalybeate waters may be imitated by adding a small quantity of solution or tincture of muriate of iron to the saline solutions.

## TABLE I. *Composition of Mineral Waters.*

| | Waters. | Cubic Inches of Gases. | | | Carbonates of | | | Sulphates of | | | Chlorides of | | | Ox. of Iron. grs. | Silica. | Temp. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Carbonic Acid Gas. | Sulphuret. Hyd. Gas. | Nitrog. Gas. | Soda. grs. | Magnesia. grs. | Lime. grs. | Soda. grs. | Magnesia. grs. | Lime. grs. | Sodium. grs. | Magnes. grs. | Calcium. grs. | | | |
| Carbonated. | Seltzer, (1) | 138 | | | 32 | 40 | 24 | — | — | — | 140 | | | — | | Cold. |
| | Pyrmont, (1) | 208 | | | — | 80 | 34.8 | — | 44.5 | 63.6 | 12.4 | | | 4.5 | | Cold. |
| | Spa, (1) | 104 | | | 11.7 | 35.3 | 11.7 | — | — | — | 1.47 | | | 4.5 | | Cold. |
| | Carlsbad, (1) | 40 | | | 39 | — | 12 | 70 | — | — | 34.6 | | | 0.125 | 2.5 | 165°. |
| Sulphur. | Moffat, (2) | 5 | 10 | | — | — | — | — | — | — | 36 | — | — | — | — | Cold. |
| | Aix-la-Chap., (1) | — | 44 | | 90 | — | 38 | — | — | — | 40 | — | — | — | — | 143°. |
| | Cheltenham, (6) | 2 | 20 | | — | — | — | 188 | 40 | 9.6 | 280 | | | 2.4 | | |
| Saline. | Seidlitz, (1) | | | | | 21 | 6.7 | — | 1444 | 41.1 | — | 36.5 | — | — | — | Cold. |
| | Cheltenham, (6) | | | | | — | — | 120 | 88 | 36 | 400 | — | — | — | — | Cold. |
| | Bath, (4) | 9.6 | | | | — | 6.4 | 12 | — | 72 | 26.4 | — | — | .016 | 1.6 | 116°. |
| | Buxton, (5) | 1.5 | | 4.64 | — | — | 10.4 | — | | 0.6 | 2.4 | 0.58 | | | | 82°. |
| | Bristol, (3) | 28 | | | | | 12 | 12 | | 12 | 4 | 8 | | | | 74°. |
| Chalybeate. | Harrowgate, (Oddie,) (5) | | | | | 0.8 | 6.7 | | | 1.86 | 300.4 | 9.9 | 22 | 2.4 | 0.4 | Cold. |
| | Tunbridge, (5) | | | | | | 0.27 | | | 1.41 | 2.4 | 0.29 | 0.4 | 2.22 | 0.4 | Cold. |
| | Brighton, (7) | 20 | | | | | — | | | 32.9 | 12.2 | 6. | — | † | 1.12 | Cold. |
| | Cheltenham, (6) | 20 | | | 4 | | — | 181.6 | 48 | 20 | 330.4 | — | — | 6.4 | | Cold. |

1. Bergman, 2. Garnet, 3. Carrick, 4. Mr. Phillips. 5. Dr. Scudamore, 6. Brande and Parkes, 7. Dr. Marcet.

† 14.4 Sulphate of Iron.

TABLE II. *Composition of Mineral Waters stated in conformity to Dr. Murray's views.*

| | Waters. | Cubic Inches of Gases. | | | | Carbonates of | | | Sulphates of | | | Chlorides of | | | Ox. of Iron. grs. | Silica. grs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Carbonic Acid. | Sulphur. Hydrogen. | Carbur. Hyd. | Nitrogen. | Soda. grs. | Magnesia. grs. | Lime. grs. | Soda. grs. | Magnesia. grs. | Lime. grs. | Sodium. grs. | Magnesium. grs. | Calcium. grs. | | |
| Carbonated. | Seltzer, (1) | 138 | | | | 109.34 | — | — | — | — | — | 54.03 | 45.7 | 26.9 | — | — |
| | Pyrmont, (1) | 208 | | | | 11.5 | 80 | 34.8 | 14.9 | 44.5 | 54.5 | — | — | 11.6 | 4.5 | — |
| | Spa, (1) | 104 | | | | 12.93 | 35.3 | 10.6 | — | — | — | — | — | 1.3 | 4.5 | — |
| | Carlsbad, (1) | 40 | | | | 51.96 | — | — | 70 | — | — | 20.2 | — | 13.44 | 0.12 | 2.5 |
| Sulphureous. | Harrowgate Old Well, (2) | 4.25 | 14 | 4.15 | 8 | 12.8 * | | | | | | 752 | 29.2 | 65.75 | | |
| | —New Well, (2) | 5.25 | 6.4 | 4.65 | 6.5 | 14.75* | | | | | | 735 | 43 | 71.5 | | |
| | Aix-la-Chap., (1) | | 44 | | | 37 | | 3.3 | — | | | — | — | 37.3 | | |
| | Cheltenham, (6) | 12 | 20 | | | — | | | 254.2 | | | 231.5 | 32 | 7.9 | 2.4 | |
| | Leamington, (5) | | not ascertained. | | | — | | | 92.8 | | | 120 | 26.4 | 63.68 | trace. | |
| Saline. | Cheltenham, (6) | | | | | | | — | 263.7 | | — | 280.2 | 70.4 | 29.6 | — | |
| | Bath, (5) | 9.6 | | | | | | 3.2 | 44.4 | | 42.4 | — | 12 8 | 9.6 | 0.12 | 1.6 |
| | Leamington, (5) | — | | | | | | — | 62.64 | | — | 430 | 161.3 | 229.1 | trace. | |
| | Buxton, (5) | 1.5 | | | 4.6 | 1.62 | | 8.9 | 0.63 | | — | — | 0.6 | 2.25 | — | |
| | Bristol, (3) | 28 | | | | | | 12 | 18.6 | | 5.76 | — | 8 | 3.7 | — | |
| | Dumblane, (4) | — | | | | | | 4 | 29.6 | | — | 168 | — | 166.5 | 1.36 | |
| | Pitcaithly, (4) | 8 | | | | | | 4 | 7.2 | | — | 101.6 | — | 161.6 | — | |
| | Sea Water, (4) | — | | | | | | — | 204.8 | | — | 1274.4 | 284 | 45.6 | — | |
| Chalybeate. | Harrowgate, (Oddie,) (5) | | | | | 8.26 | | | 1.97 | | — | 289.5 | 10.8 | 31 | 2.4 | 0.4 |
| | Tunbridge, (5) | | | | | 0.29 | | | 1.5 | | — | 0.9 | 0.3 | 1.85 | 2.22 | 0.4 |
| | Brighton, (7) | | | | | — | | | 14.68 | | 18.8 | — | 6. | 11.4 | † | 1.12 |
| | Cheltenham, (6) | | | | | 4 | | | 260 4 | | — | 264 | 38.4 | 16 5 | 6.4 | — |

1. Bergman, 2. West, 3. Carrick, 4. Dr. Murray, 5. Dr. Scudamore, 6. Brande and Parkes, 7. Dr. Marcet.

* Bicarbonate of Soda. † 14.4 Sulphate of Iron.

## II.—Of the gases employed as remedies.

Substances existing in the aërial form might *a priori* be supposed capable of producing important effects on the system, as by respiration they are brought to act on the mass of blood, and induce in it chemical changes. They occasion, too, important alterations in the functions of life, some of them producing the highest excitement, others occasioning depression and exhaustion of power. And in the classes of aërial substances, we have actually the two extremes of stimulant and sedative power, in the examples of nitrous oxide and carburetted hydrogen.

Though the expectations that were at one time formed, with regard to their medicinal efficacy, have not been realized, and the use of them is nearly relinquished; yet, since they are capable of producing such changes in the state of the functions, and of the general system, and since the proposition must be admitted, that every substance possessed of these powers may be capable of producing medicinal effects, they ought not to be entirely lost sight of, and a few observations on their operation are necessary to complete the history of the Materia Medica.

The modes of preparing these gases are, in a great measure, peculiar to each. The manner of administering them is nearly the same. They may be breathed from a jar placed in water; but this is laborious, from the effort required to sustain the column of water within the jar. This may be partly remedied, by poising the jar in water, or by breathing from a gasometer. But the easiest mode is, for the patient to breathe the gas from a silk bag, to which a tube with a stop-cock is affixed.

The gases that have been employed in medicine may be considered under the divisions of those which *excite*, and those which *depress* the functions of life. To the former order belong Oxygen Gas, and Nitrous Oxide Gas.

Oxygen gas is procured from black oxide of manganese by heat. A quantity of the oxide is put into an iron retort, connected by a tube with a glass holder, or a large jar filled with water, inverted and placed on the shelf of the pneumatic trough. The retort is exposed to a full red heat; at this temperature the affinity of the oxygen to the manganese is so far weakened by the repulsive agency of the caloric, that a large portion of it is separated from the combination, and assumes the elastic form; the gas is transmitted through water, and is allowed to stand over it for some hours before it is breathed.

Oxygen, when respired, acts principally by communicating a stimulating quality to the blood, by which the left side of the heart and the arterial system are excited to action; hence, when its supply by respiration is suspended, the contractions of the heart become feeble, and at length cease, as Goodwyn demonstrated. The state of asphyxia, from its abstraction, proves that it likewise exerts some other operation more immediately subservient to the functions of life; for in that state the functions of life are suspended, while the contractions of the heart continue, to a certain extent, as the experiments of Coleman shewed.

The diseases in which oxygen gas has been administered, are principally those of chronic debility,—chlorosis, asthma, scrofula, dropsy, paralysis, and some cutaneous affections. It requires to be diluted with from ten to twenty or more parts of atmospheric air, increasing the proportion of oxygen according to the effects produced. From one to two parts of oxygen are given, by breathing it in its diluted state, at intervals, in the course of the day. It generally increases the force and velocity of the pulse.

Nitrous oxide gas.—This gas, a compound of oxygen and nitrogen, in the proportion of one atom of the former, 8, with one atom of the latter, 14, is obtained, in greatest purity, from the decomposition of nitrate of ammonia by heat. When the salt is exposed to a temperature about 400° of Fahrenheit's scale, its principles re-act on each other, and enter into new combinations. The hydrogen of the ammonia attracts part of the oxygen of the nitric acid, and forms water; and the remaining oxygen, combining with the nitrogen both of the acid and of the ammonia, forms nitrous oxide, which is disengaged in the gaseous form. The following diagram exhibits more precisely the nature of this re-action:

| | | |
|---|---|---|
| 54 Nitric Acid | Oxygen, 3 atoms . . . 24 | 27 Water, 3 equiv. |
| | Oxygen, 2 atoms . . . 16 | |
| | Nitrogen, . . . . . . . . 14 | |
| 17 Ammonia | Hydrogen, 3 atoms . 3 | |
| | Nitrogen, . . . . . . . . 14 | 44 Nitrous Ox. 2 equiv. |

Thus the salt is resolved into three equivalents of water, and two equivalents of nitrous oxide gas. After its production, the gas requires to stand some hours, to deposite a little saline vapour, before it is fit to be breathed.

The effects of nitrous oxide gas on the system, when it is respired, are scarcely analogous to those of any other agent. The excitement which it produces is extended to the functions of body and mind with more rapidity and force than that arising from the action of the most powerful stimulants. It is accompanied, too, with effects as various as they are peculiar; it excites a peculiar thrilling of the body, with feelings of pleasure not easily described. Muscular vigour is increased, so that unusual exertions are made with alacrity and ease, and there is even strong propensity to muscular exertion; the mind is also affected: there is usually a high degree of exhilaration, yet even when this is greatest, perfect consciousness remains. What still more marks the singularity of its operation, this high excitement of the functions of life and exhilaration of mind is not followed by proportional languor or debility; the state of the system gradually returns to the healthy standard, without any apparent waste of power. A substance capable of acting in such a manner, we might suppose, would prove one of the most valuable remedies. The transient nature of its operation must undoubtedly limit its efficacy; but still, in diseases of extreme debility, we seem justified in expecting from its administration beneficial effects. It has not, however, been extensively employed. In paralysis it has been used with advantage. In diseases of increased sensibility, it may prove hurtful; and when breathed by delicate females, it has, in more than one case, induced hysteric affections. The dose requisite to produce its peculiar effects varies from four to nine quarts, which may be breathed pure or diluted with an equal part of atmospheric air. It cannot be breathed undiluted for more than four minutes and a half, insensibility being induced. And it requires to be attended to, in its administration, that its effects are considerably different in different individuals. On some, its operation has even been productive of unpleasant consequences.—palpitation, fainting, and convulsions.

Nothing satisfactory can be said as to its mode of action, since we know so little of the connection which subsists between the phenomena of life and the chemical changes which are carried on in the system. It is absorbed by the blood when respired; but we can discover nothing connected with its composition or chemical agency which can lead to any explanation of its peculiar effects.

Under the second subdivision of the Gases,—those which depress the functions of life, might probably be placed all the substances existing in the aërial form, oxygen and nitrous oxide excepted. The following are those which have been applied to medicinal purposes; Hydrogen, Carburetted Hydrogen, Carbonic Acid, Muriatic Acid, Nitrous Acid and Chlorine Gas.

Hydrogen gas is most easily procured by the action of diluted sulphuric acid on iron or zinc, as represented in the diagram, p. 502. This gas received into the lungs does not appear to exert any positive deleterious power: all its effects seem referable to the exclusion of oxygen. In a pure state, if the lungs have been previously emptied as much as possible of atmospheric air, it can be breathed but for a very short time: it quickly occasions a giddiness and sense of suffocation; the countenance becomes livid, and the pulse sinks rapidly, and a state of insensibility is soon induced. When diluted with two-thirds or an equal part of atmospheric air, it can be safely breathed; nor does it appear to produce any very important effect. It occasions some diminution of muscular power and sensibility, and a reduction of the force of the circulation. It has been respired, diluted, usually with four or five parts of atmospheric air, in catarrh, hæmoptysis, and phthisis; but its powers seem merely those of a palliative, dependent on the partial exclusion of the stimulating power of oxygen.

Carburetted hydrogen gas.—The gas which has been used in medicine under this name is obtained by passing the vapour of water over charcoal at the temperature of ignition, in an iron tube. The oxygen of the water unites with one part of the charcoal, forming carbonic acid; the hydrogen combines with another part of it, and forms this species of carburetted hydrogen. The carbonic acid is abstracted by agitating the gas in lime water.

This is the most active of those gases which operate by depressing the functions of life, and is perhaps the most powerful agent of this kind. Even when largely diluted with atmospheric air, it occasions immediate vertigo, sickness, diminution of the force and velocity of the pulse, reduction of muscular vigour, and in general every symptom of diminished power. It can scarcely be breathed in an undiluted state. Davy found, that at the third inspiration total insensibility was induced, and symptoms of extreme debility continued for a considerable time.

As a medicinal agent, it is the elastic fluid of which the evidence of its efficacy was greatest. In phthisis, in many cases, it unequivocally relieved the symptoms, and arrested the progress of the disease; and in diseases of increased action or increased power, much benefit might, from its known operation, be expected from its use. Great caution was found requisite in the trials that were made of it, with regard to the dose. At first, one pint of the carburetted hydrogen gas, diluted with twenty parts of atmospheric air, may be respired: the quantity may be slowly increased, and with less dilution, taking care to avoid the production of great vertigo or muscular debility. Not more than from two to four quarts can be taken in the day, even when the patient has been accustomed to it for some time. It is more powerful when recently prepared than when it has been kept for some days, a circumstance requiring to be attended to in the regulation of its dose.

Carbonic acid gas.—This gas is easily procured from the action of diluted sulphuric or muriatic acid on carbonate of lime, (chalk or marble,) p. 423. The action of this gas when inspired is very deleterious. It appears, from Davy's experiments on its respiration, to excite spasmodic contraction of the epiglottis, so as to induce suffocation; and it has this effect when diluted with nearly an equal part of atmospheric air. The operation of it is even more speedily fatal than that of any other agent that acts by occasioning merely suffocation, which would lead to the supposition that it acts by some positive power,—a supposition confirmed too by the fact, that in animals, in whom the symptoms of life have been suspended by its respiration, the irritability of the heart is entirely destroyed.

The respiration of carbonic acid gas was employed at an earlier period than that of the other gases, and sanguine expectations were formed of it as a remedy in phthisis. In the many cases, however, in which it has been tried, though it frequently proved useful for a time, by lessening the expectoration, diminishing the hectic fever, and acting as an anodyne, there is little evidence of its having ultimately effected a cure. The difficulty, indeed, in employing this and all the other gases, is that of obtaining their continued operation. In that state of disease existing in the lungs, in the earlier stages of phthisis, much advantage, for example, might probably be derived from the continued respiration of a reduced atmosphere, while little can be expected merely from its occasional operation. Carbonic acid gas, when employed, was respired diluted with four or six parts of atmospheric air. It has been found, in that irritable state of the lungs, in which cough and dyspnœa are excited from the application of cold, to be attended with considerable advantage when it is breathed in a diluted state; and an easy mode of employing it with this view, is to put a mixture of chalk or marble with diluted sulphuric acid and water into a large glass bottle, so that it shall occupy a depth only of a few inches. The carbonic acid gas is extricated, and forms an atmosphere mixed with atmospheric air in the upper part of the vessel, which may be breathed by introducing a glass tube to about the middle of the bottle, and inspiring from it.

Carbonic acid has likewise been employed as a local application to cancer and painful ulceration, and has been serviceable at least as a palliative. A stream of it is directed on the part by means of a flexible tube, taking care to transmit the gas previously through water, if it has been obtained by the action of an acid on carbonate of lime, and confining it for some time over the sore by a funnel connected with the tube. A catasplasm, formed of substances in a state of fermentation, has a similar effect, and it is more convenient in its application. (p. 549).

The three last gases which I have enumerated, Muriatic Acid, Chlorine, and Nitrous Acid Gas, require notice under this section only as having been applied to one medicinal purpose,—that of neutralising or destroying noxious or contagious effluvia. These effluvia are probably evolved by chemical processes, and must consist of principles in forms of combination subject to chemical agency, and capable of being subverted by its exertion. It has accordingly been found, that the air of places, offensive from the presence of such effluvia, is corrected, and its freshness restored, by the diffusion of those acid gases, the operation of which, in changing the chemical constitution of compound elastic fluids, is most powerful.

Muriatic acid gas.—The vapours of vinegar raised by heat, and of sulphurous acid disengaged in the burning of sulphur, or the deflagration of sulphur and nitre, had long been employed as the most active means of fumigation. Dr. James Johnson, at an early period, 1758, proposed muriatic acid; but little attention appears to have been given to the proposal. In 1773, Guyton Morveau employed it on a large scale, the use of it having been suggested to him by an hypothesis which he had formed of the nature of those noxious effluvia which arise from the decomposition of animal matter. The atmosphere of the Cathedral Church at Dijon had become ex-

tremely offensive and noxious, from exhalations from cemeteries within the church, and the methods of fumigation at that time usually practised had been employed without any advantage. Morveau supposed, that the putrid odour of these effluvia must arise from the ammonia, which is abundantly formed in the decomposition of animal matter, combined with a small portion of acrid oily matter formed in the same process. To neutralise this impregnation, a volatile acid, which should be capable of being easily diffused through the air, seemed to be most proper, and this led to the employment of the muriatic acid gas. A mixture of sea salt and sulphuric acid, supported over burning fuel, was placed in the body of the church, the doors being closed for twelve hours. When opened at the end of that time, the putrid odour was entirely gone. In some subsequent trials in prisons and other situations, the same method proved equally successful. The vapour of the acid might perhaps, by some operation similar to that which Guyton supposed, lessen or remove the putrid odour; but it can scarcely be supposed capable of destroying noxious effluvia, as, of all the acids, it is the one which, from being unable to impart oxygen, is least powerful in subverting the combination of compounds. And other gases having since been employed, more active in this respect, muriatic acid gas is now scarcely employed.

Chlorine gas.—The process by which this gas is procured has been already described, (p. 414,) and its principal medicinal application, it has been stated, is by fumigation to destroy noxious or contagious effluvia. It changes rapidly the constitution of the greater number of the compound gases; and accordingly it has been established by Guyton's experiments, that air tainted with a putrid odour, by exposure to substances in a state of putrefaction, has this odour removed by the action of chlorine; and, in the subsequent applications of it to destroy deleterious and contagious effluvia, its superior powers appear to have been sufficiently established.

Chlorine gas is applied to the purpose of fumigation by disengaging it by the usual process. Four parts of muriate of soda, one of black oxide of manganese, two of sulphuric acid, and one of water, may be mixed in earthen pipkins, which, to promote the disengagement of the gas, may be placed in a sand-bath over a charcoal fire, and distributed in the apartment designed to be fumigated, the doors and windows being closed. After a few hours, the air may be admitted, and ventilation established, to remove completely the vapours of chlorine. The only disadvantage to which it is liable is, that, from its suffocating odour, the atmosphere in which it is diffused cannot be breathed, which in some situations renders it inapplicable, as requiring the removal of the sick.

Instead of preparing chlorine gas for fumigations, it is now common to employ the chloride of lime or of soda, compounds in which the chlorine is retained by an affinity so weak, that it gradually escapes on exposure to the air. Solution of chloride of soda forms the Disinfecting Liquor of Labarraque, which is much employed for this purpose in France. Mr. Faraday has given the following formula for preparing it: Dissolve in a pint of water 2110 grains of crystallized subcarbonate of soda, and transmit through the solution chlorine gas, obtained by heating together 755 grains of common salt, 570 of peroxide of manganese, and 750 of sulphuric acid, previously diluted with an equal quantity of water. The liquor must be kept in well-closed phials; and when it is to be used for destroying noxious effluvia, the phials are opened, or the liquor poured into an open shallow vessel.

Nitrous acid gas.—The application of nitrous acid gas to the purposes of fumigation was principally introduced by Dr. Carmichael Smyth. In energy of chemical action it is inferior to chlorine gas, and is probably, therefore, inferior to it in the power of destroying noxious or contagious effluvia. The evidence brought forward by Dr. Smyth seems to prove, however, that it has considerable activity, and that fumigation with it is successful in restoring the purity of a corrupted atmosphere; and it has the advantage, that its odour being less unpleasant and deleterious than that of chlorine, fumigation with it in the wards of an hospital or ship, where the sick cannot well be removed, may be had recourse to without inconvenience. It is applied by mixing two parts of nitre in powder, and one part of sulphuric acid, placing this mixture in small earthen cups in warm sand, and renewing the heat occasionally as long as any vapours continue to be exhaled. Several vessels containing a few ounces of this mixture are placed in the apartment.

## ELECTRICITY.

The medicinal operation of electricity may be referred to its stimulating power. It produces forcible contractions in the muscular fibre; excites therefore to action, if duly applied, and, when in excess, immediately exhausts irritability. As a stimulant it

possesses the important advantages of being easily brought to act locally, and of being limited to the part to which it is applied, without at all affecting the general system, while it can also be employed in every degree of force.

Electricity is applied medicinally under the form of the stream or continued discharge of the fluid, under that of sparks, and under that of a shock: the first being the most gentle, the second being more active, and the last being much more powerful than either of the others. The electric stream is applied by connecting a metallic wire, or, what is better, a pointed piece of wood by a chain, with the prime conductor of the electric machine, and holding it by an insulated rod one or two inches distant from the part to which it is to be directed, while the machine is worked. An impression is felt similar to that of a current of air, and a very moderate stimulant operation is thus excited, which is better adapted to some particular cases than the more powerful spark or shock. The spark is communicated by applying a metallic knob connected with a rod in communication with the machine, the operator holding the rod by a glass handle, and bringing the knob within the distance of half an inch, an inch, or two inches, from the part to which the spark is intended to be applied: or, what some have considered as a preferable mode, the patient is placed on an insulated stool, holding a chain connected with the prime conductor, and, while the machine is worked, a metallic knob is brought by the operator within a similar distance of the part from which the spark is to be taken; a sensation somewhat pungent is excited, and slight muscular contractions may be produced; these effects being greater or less, according as the spark is more powerful, this being regulated by the distance at which the knob is held, if the machine be sufficiently in action. The shock is given by discharging the Leyden phial, making the part of the body through which it is intended to be transmitted part of the circuit, a chain, for example, connected with the external surface of the coated jar being applied to the shoulder, when the shock is to be sent through the arm, and the knob of the rod communicating with the inner surface of the jar being applied to the wrist. The shock is of course stronger as the phial is large, and as it is fully or partially charged; the sensation it excites is unpleasant, and the muscular contractions considerable.

At the introduction of electricity as a remedy, it was highly celebrated for its efficacy in a number of diseases; its use is now confined to a few. In paralysis it is not unfrequently had recourse to, to excite muscular contraction, and perhaps with some advantage. It is usually applied under the form of sparks, the application of it requiring to be continued daily for a considerable time. Sometimes moderate shocks are also employed; but the propriety of this practice is doubtful. In amenorrhœa, as the stimulant operation can be excited, in some measure, in the vessels which are affected, advantage may be derived from electricity; and it is occasionally used, both under the form of sparks taken from the pelvis and that of moderate shocks transmitted through it. Ophthalmia, and some other varieties of inflammation, have been removed by the electric stream; it has also succeeded in discussing tumours, and relieving pain. The general rule for the medical employment of electricity, is to apply it at first under the milder forms, and gradually to raise it, if necessary, to the more powerful, taking care only not to employ it in too high a state of intensity, but in the greater number of cases rather to expect advantage from its continued and moderate use. In its application to the treatment of paralysis, for example, the only rational indication is to excite moderate muscular action, with the view of increasing the muscular power; to this, sparks of sufficient strength are adequate; and, in employing shocks, there is some risk of exhausting the irritability of the part through which they are transmitted.

The modification of electricity, termed Galvanism, has also been applied to the cure of disease, and differs somewhat in its action being more extended than that of electricity, which is more local in its agency. Galvanism is applied by connecting two metallic wires with the two extremities of a galvanic battery, and bringing them in contact with the part affected, so that it shall form part of the circuit of the galvanic discharge: the one wire is kept in contact with the part it touches; the other is alternately applied for a moment, and removed, and this is continued for some time. If the skin is moistened, the galvanic influence is communicated more readily and effectually; and still more so if a small piece of metallic leaf, as tinfoil, be laid on the parts to which the wires are applied. Sometimes even the cuticle has been removed by a blister; but the application of the galvanism is then attended with pain, and this is unnecessary, if a galvanic apparatus of sufficient power be employed. One constructed of plates of zinc and copper, four inches square, and including from 25 to 50 of each metal, is sufficient for the greater number of purposes, a greater or less number of the plates being included in the circuit, according to the

strength of the application required. The liquid best adapted to excite it, is a solution of muriate of soda, with a little muriatic acid; diluted nitric acid, though more powerful, having its power sooner exhausted, and its action being attended with a disengagement of nitrous gas.

It is chiefly in nervous diseases that galvanism is applied; it is sometimes productive of benefit in paralysis, chorea, tetanus and other spasmodic affections. It appears in several instances to have relieved deafness arising from torpor of the auditory nerve; it has been successful in discussing indolent tumours, and might probably be advantageously conjoined with the use of iodine; being a mode of applying a stimulus to a gland which might assist in directing the action of the iodine to the absorbents of the part. In cases of asphyxia from suspended respiration, the galvanic shock transmitted through the chest has been found to excite powerfully, but momentarily, the action of the heart and diaphragm.

## OF MEDICAL PRESCRIPTIONS.

The principal objects designed to be attained by the composition of Medicines, are, to communicate an agreeable taste or flavour; to give a convenient form; to correct the operation of the principal medicine, or obviate some unpleasant symptom it is liable to produce; to promote its action by the substances combined with it exerting one of a similar kind; to obtain the joint operation of remedies, which have different powers, but which may be required to obviate different morbid symptoms present together; or, lastly, to change the usual effects of the substances mixed, and obtain a remedy different from either, by the power which one may have of modifying the action of another. Some of these effects are highly important, and establish the propriety of conjoining medicines in one formula.

A prescription has been usually divided into four parts, which compose it,—the *basis*, or principal ingredient of the prescription; the *adjuvans*, or that which is designed to promote the action of the former; the *corrigens*, or that intended to correct its operation, or obviate any unpleasant symptom which it may be apt to produce; and the *constituens*, or the substance which gives to the other ingredients consistence of form. All these are not necessarily present in every formula, as some of these purposes may not require to be attained; nor is the division itself of much importance, except that it affords perhaps the best general rule for regulating the order in which the ingredients of a prescription should be enumerated, the order being conformable to that which corresponds with this arrangement.

The following are the principal circumstances to be attended to in forming a prescription; and the observation of which may guard against the errors liable to be committed in the composition of medicines.

1*st*, Simplicity is to be attained, so far as is consistent with the objects of the prescription. Nothing ought to enter into the composition which does not add to its virtue, render it less ungrateful, give it a convenient form, or which is not necessary to conceal any particular ingredient; and, in general, the practice of accumulating a number of articles in one prescription is to be avoided, as there is always the risk of one counteracting or modifying the action of another; at least, the addition of less active substances can do little more than add to the bulk of the principal medicine, or cause it to sit uneasy on the stomach.

2*dly*, Substances, it is evident, ought not to be mixed together, which are capable of entering into chemical combination, or of decomposing each other, unless it be with the view of obtaining the product of the combination, or decomposition, as a remedy. Errors with regard to this are most likely to occur in mixing together saline and metallic preparations.

3*dly*, Those mixtures are also to be avoided in which one medicine, by its peculiar action on the stomach or general system, modifies and changes the action usually exerted by another, unless where the object is to obtain the effects of that modified operation.

4*thly*, The error of contra-indication is to be guarded against, or those medicines ought not to be combined, the virtues of which are not merely different, but are, in some measure, opposed to each other,—an error not very likely to occur with regard to the principal ingredients of a prescription, but which may happen sometimes to a less extent with regard to those of inferior importance.

5*thly*, The ingredients which are to be combined must be such as will mix properly together, so that the form in which the remedy is designed to be exhibited may be easily obtained and preserved.

*Lastly*, The form under which a medicine is prescribed must be adapted to certain

circumstances; principally to the nature of the disease, the nature of the remedy itself, and, as far as can be conveniently attained, to the taste of the patient. Those medicines which are nauseous, which operate in a small dose, or are designed to operate slowly, or which have a considerable specific gravity, are usually given under the form of pill, or sometimes of bolus. Those which are less ungrateful, or the operation of which is designed to be immediately obtained, are given in the form of electuary, or under some liquid form. Tinctures always require to be diluted; infusions or decoctions may in general be given in the state in which they are prepared. These last are always of extemporaneous preparation, as they cannot be preserved long uninjured, and the proper application of them must depend on the chemical properties, and chiefly on the solubility in the menstruum, of the active principles of the substance submitted to preparation.

The Doses of Medicines are not reducible to any general rules, from their general similarity of operation, or any other circumstance, and are therefore specific with regard to each substance. But there are certain general circumstances by which their operation is influenced, which require to be attended to in apportioning the dose. The most important of these are, Age, Sex, Temperament, Idiosyncrasy, Habit, and Disease.

*Age.*—From infancy to manhood, a larger dose of any medicine is requisite to produce its effect, in proportion to the advance in life. From manhood to old age, it has been supposed, that there is a similar gradation with regard to diminution of dose; but this is undoubtedly in a less proportion than that which regulates the increase. The following table by Gaubius has been supposed to shew these proportions, with regard to the early periods of life in which the necessity for the diminution of dose is unquestionable.

Let the dose for a person of middle age be 1 or 1 drachm.

| | |
|---|---|
| For one from xiv to xxi years, it will be | $\frac{2}{3}$ or 2 scruples. |
| ——— vii to xiv . . . . . | $\frac{1}{2}$ or half a drachm. |
| ——— iv to vii . . . . . | $\frac{1}{3}$ or 1 scruple. |
| ———of iv years of age . . . . | $\frac{1}{4}$ or 15 grains. |
| ———iii ——— . . . . | $\frac{1}{6}$ or half a scruple. |
| ——— ii ——— . . . . | $\frac{1}{8}$ or 8 grains. |
| ——— i ——— . . . . | $\frac{1}{12}$ or 5 grains. |

*Sex.*—Women, in general, require rather smaller doses of any active medicine than men,—a difference which is probably owing principally to their greater sensibility from their habits of life.

*Temperament.*—By Temperament is understood a predisposition, derived from original conformation, to be affected in a peculiar manner by external causes acting on the system; and much laborious investigation has been bestowed in distinguishing the different temperaments, and the diversities to which they give rise. With regard to their influence in the operation of medicines, those of the sanguine temperament are supposed to be more easily affected, and therefore to require smaller doses than those of the phlegmatic or melancholic. In what has been said, however, on this subject, there is so much uncertainty and hypothesis, that little reliance can be placed on it.

*Idiosyncrasy.*—This denotes that disposition in individuals, unconnected with general temperament, to be affected by certain causes, in a manner different from the generality of mankind. Such idiosyncrasies exist with regard to medicines, as well as to other agents, and, where they are known, they may require to be attended to by the prescriber.

*Habit.*—This has an important influence on the operation of medicines. In general, it diminishes the effect resulting from the action of external powers on the system; hence medicines often lose part of their power by their administration having been long continued, and the doses of them, therefore, require to be enlarged under their protracted use. This is particularly the case with stimulants and narcotics, and is even observed, to a certain extent, in some of the other classes of the Materia Medica. In a few instances, the reverse has been supposed to hold true, particularly with regard to emetics and saline cathartics.

*Disease.*—This has an influence on the doses of medicines not less important; the susceptibility to external impressions, being much varied in morbid affections, and the operations of remedies of course being modified by such variations. The state of susceptibility being in general apparent, when it varies much from the healthy standard, the doses of the medicines administered are regulated accordingly, and this, it

is obvious, admits of no general observations, as being entirely dependent on the nature and state of disease.

Tables are given by the Colleges, to shew the proportions of Tartar Emetic, Opium, Mercury, Arsenic and Iodine in certain preparations of these substances, ordered in the Pharmacopœias. The following table exhibits these proportions:

| *Preparation, and its Quantity.* | | *Active Ingredient, and its Quantity.* | |
|---|---|---|---|
| Vinum Tartratis Antimonii, Ed. | 1 oz. | Tartar Emetic. | 2 grains. |
| ——— Lond. | 4 fl.-dr. | ——— | 1 gr. |
| Liquor Tartari Emetici. Dub. | 1 oz. | ——— | 2 grs. |
| Tinctura Opii (Laudanum). E. | 1 dr. | Opium. | $3\frac{1}{2}$ grs. |
| ——— D. | 1 fl.-dr. | ——— | $4\frac{1}{2}$ grs. |
| Tinctura Opii Camphorata, (English Paregoric). E. | 1 oz. | ——— | 2 grs. |
| ——— D. | $4\frac{1}{2}$ fl.-dr. | ——— | 1 gr. |
| Tinctura Opii Ammoniata, (Scotch Paregoric). E. | 1 dr. | ——— | 1 gr. |
| Tinctura Saponis cum Opio. E. | 1 oz. | ——— | 1 scr. |
| Acetum Opii. D. | 1 fl.-dr. | ——— | $7\frac{1}{2}$ grs. |
| (20 drops = 30 of the tincture). | | ——— | 1 gr. |
| Pulvis Ipecacuanhæ et Opii. E. L. D. | 10 grs. | ——— | 1 gr. |
| ——— Opiatus. E. | 10 grs. | ——— | 1 gr. |
| ——— Cornu usti cum Opio. L. | 10 grs. | ——— | 1 gr. |
| ——— Kino compositus. L. D. | 1 scr. | ——— | 1 gr. |
| ——— Cretæ comp. cum Opio. L. D. | 2 scr. | ——— | 1 gr. |
| Pilulæ Opiatæ. E. | 10 grs. | ——— | 1 gr. |
| ——— Saponis cum Opio. L. D. | 5 grs. | ——— | 1 gr. |
| ——— e Styracc. D. | 5 grs. | ——— | 1 gr. |
| Trochisci Glycyr. cum Opio. E. | 1 dr. | ——— | 1 gr. |
| Electuarium Opiatum. E. | 1 dr. | ——— | $1\frac{1}{2}$ gr. |
| ——— Catechu comp. E. D. | 1 oz. | ——— | $2\frac{1}{2}$ grs. |
| Confectio Opii. L. | 36 grs. | ——— | 1 gr. |
| ——— D. | 25 grs. | ——— | 1 gr. |
| Hydrargyrum cum Creta. L. | 3 grs. | Mercury. | 1 gr. |
| ——— D. | 3 grs. | ——— | 2 grs. |
| ——— Magnesia. D. | 3 grs. | ——— | 2 grs. |
| Pilulæ Hydrargyri. E. | 1 dr. | ——— | 15 grs. |
| ——— L. D. | 3 grs. | ——— | 1 gr. |
| Unguentum Hydrargyri. E. | 1 dr. | ——— | 12 grs. |
| (with double mercury). | 1 dr. | ——— | 24 grs. |
| Unguent. Hydrarg. fortius. L. D. | 2 drs. | ——— | 1 dr. |
| ——— mitius. L. | 6 drs. | ——— | 1 dr. |
| ——— D. | 4 drs. | ——— | 1 dr. |
| ——— Oxidi Nitrici. D. | 1 dr. | ——— | $6\frac{1}{3}$ grs. |
| ——— Nitratis. D. | 1 dr. | ——— | 3 grs. |
| ——— Nitratis fortius. E. | | | |
| ——— (Citrine Ointment). | 1 dr. | ——— | 4 grs. |
| ——— mitius. E. | 1 dr. | ——— | $1\frac{1}{2}$ grs. |
| Linimentum Hydrargyri. L. | 6 drs. | ——— | 1 dr. |
| Emplastrum Hydrargyri. E. | 1 dr. | ——— | 16 grs. |
| Pilulæ Hydrarg. Submur. E. L. | 4 grs. | Calomel. | 1 gr. |
| ——— Calomelanos. D. | 5-6 grs. | ——— | 1 gr. |
| Liquor Hydrarg. Oxymur. L. | 2 fl.-oz. | Cor. Sublim. | 1 gr. |
| Unguent. Hyd. Oxidi cinerei. E. | 1 dr. | Oxide Merc. | 15 grs. |
| ——— rubri E. | 1 dr. | ——— | 7 grs. |
| ——— Submur. Amm. D. | 1 dr. | Am. Submur. Mercury. | 5 grs. |
| Solutio Arsenicalis. E. | 1 dr. | Ox. Arsenic. | $\frac{1}{2}$ gr. |
| Liquor Arsenicalis. L. D. | 1 fl.-dr. | ——— | $\frac{1}{2}$ gr. |
| Tinctura Iodinii. D. | 1 fl.-dr. | Iodine. | 5 grs. |

I have introduced into this edition the following table of the composition of various Patent Medicines and Nostrums, compiled chiefly from Dr. Paris' "Pharmacologia," Mr. Brande's "Pharmacy," and the excellent work on Medical Botany of Dr. Stephenson and Mr. Churchill. A few of these empirical preparations are of some value, the greater number are positively hurtful, and the rest are disguised preparations taken from the Pharmacopœias. It is of some utility to be acquainted with their composition, as it may at least indicate the means that should be used to remedy injurious effects that may have been produced by their use.

## COMPOSITION OF VARIOUS EMPIRICAL PREPARATIONS.

*Ague Drop*, p. 473.

*Almond Paste.*—A cosmetic for softening the skin and preventing chaps, composed of Bitter Almonds blanched, 4 ounces, the white of an egg, rose water and rectified spirit, equal parts, as much as may be necessary.

*Anderson's Pills*, consist of the Barbadoes Aloes, with a proportion of Jalap and oil of Aniseed.

*Anisated Balsam of Sulphur*, once a celebrated remedy for hoarseness, consisted of the "Oleum Sulphuratum," with the addition of a sixth part of the essential oil of aniseed. Ten drops were taken two or three times a-day, mixed with powdered sugar.

*Anodyne Necklaces*, consist of roots of Hyosciamus strung together in the form of beads: they are sold under this name to tie round the necks of children, to facilitate the growth of their teeth, and allay the irritation of teething.

*Anti-Pertussis*, a nostrum sold as a remedy in hooping-cough; its chief ingredient is sulphate of zinc.

*Anti-Venereal Drops*, are composed, according to Scheele's analysis, principally of muriate of iron, with a small proportion of corrosive sublimate.

*Aromatic Lozenges of Steel*, consist of sulphate of iron with a small proportion of tincture of Cantharides.

*Aromatic Vinegar*, p. 342.

*Bacher's Tonic Pills* are composed of equal parts of the Extract of Hellebore and Myrrh, one ounce, with three drachms of powdered Carduus Benedictus, which are made into a mass, and divided into pills, each weighing one grain; from two to six of them may be given three times a-day. Given as a hydragogue cathartic, but of little efficacy.

*Bailey's Itch Ointment*, contains Nitre, Alum, Sulphate of Zinc, and Cinnabar, made into an ointment with Olive Oil and Lard, and perfumed with the essential oils of Anise Seeds, Origanum and Lavender, and coloured with Alkanet root. An ointment said to be used with much success by the Indians in inveterate itch, consists of finely powdered Cocculus Indicus, mixed with a little warm Castor Oil.

*Balsam of Honey*, is tincture of Benzoin, or of Tolu.

*Balsam of Horehound*, for the cure of colds, asthmas, catarrhs, &c. It consists of an aqueous infusion of horehound and liquorice root, with double the proportion of proof-spirit and brandy; to which is added, opium, camphor, benzoin, squill, oil of aniseed, and honey.

*Balsam of Liquorice*, consists principally of Paregoric Elixir, strongly impregnated with oil of aniseed.

*Balsam of Rakasiri*, consists of highly rectified spirit of wine, flavoured with oil of rosemary; it is advertised as a remedy for consumption, which it is more likely to occasion.

*Barclay's Antibilious Pills.*—Take of the Extract of Colocynth, 2 drachms; Extract of Jalap, 1 drachm; Almond Soap, a drachm and a half; Guaiac, 3 drachms; Tartarized Antimony, 8 grains; Essential Oil of Juniper, Caraway and Rosemary, of each 4 drops; of Syrup of Buckthorn, as much as will be sufficient to form a mass, which is to be divided into sixty-four pills.

*Barclay's Itch Ointment* has for its basis, powder of white hellebore, perfumed with essence of lemons; it is inferior in efficacy to the Ung. Helleb. albi.

*Bark, Essential Salt of*, is merely an extract prepared by macerating the bruised substance of bark in cold water, and submitting the infusion to a very slow evaporation.

*Bateman's Pectoral Drops*, consist principally of the Tincture of Castor, with portions of camphor and opium, flavoured by anise seeds, and coloured by cochineal.

*Bate's Anodyne Balsam*, consists of one part of Tincture of Opium, and two of the Linimentum Saponis compositum.

*Bate's Tincture of Rhubarb*, according to Mr. Brande, is prepared in the following manner: "Take of Rhubarb Root sliced, Liquorice Root sliced, of each two ounces; Anise Seeds bruised, purified Sugar, each one ounce; Proof Spirit, two pints. Macerate for fourteen days, and strain." This preparation is considered by Mr. Brande as preferable to the Compound Tincture of Rhubarb of the Pharmacopœia, as the aniseed covers the nauseous taste of the Rhubarb.

*Battley's Liquor Opii Sedativus.*—This valuable preparation of opium is supposed to

owe its efficacy to the presence of Acetate of Morphia. Its effects are found to be mild and uniform, and it appears to be devoid of exciting, and almost of constipating properties. It is found, however, to change on being kept for some time, and its power diminishes. Mr. Haden states, that he made a preparation possessed of the same advantages as the *liquor opii sedativus*, by macerating the dregs remaining after making tincture of opium, in a solution of Tartaric acid; 40 drops of the tincture which was thus prepared, acted in all respects like 20 of Mr. Battley's *liquor sedativus*.

*Baume de Vie*, p. 325.

*Baynton's Adhesive Plaster.*—This excellent plaster differs from the Emplastrum Resinæ of the Pharmacopœia, in containing less resin, six drachms only being added to one pound of the litharge plaster.

*Bestuscheff's Nervous Tincture*, is a preparation of iron much used in Germany, the secret of which was purchased and published by the Empress Catharine. The formula given by Mr. Brande, from the Prussian Pharmacopœia, is as follows: "Take of Iron in powder, any quantity; dissolve it in a sufficient quantity of Muriatic Acid mixed with a fourth part of Nitric Acid, and evaporate. Place the dry mass in a cellar, that it may deliquesce into a liquor of a deep reddish brown colour. Mix this liquor with twice the quantity of Sulphuric Ether, shaking them together; pour off the Ether impregnated in this manner with the solution of iron, and mix it thoroughly with double the quantity of the strongest Spirit of Wine. Expose the mixture in oblong glass vessels, well closed, to the rays of the sun, until the colour entirely disappears, then carefully preserve it." This preparation is also inserted in the Parisian Codex, under the name of "Tinctura Ætherea Alcoholica de Muriate Ferri."

*Blaine's Powder* for the Distemper in Dogs. The basis of this nostrum is the Aurum Musivum, or Sulphuret of Tin.

*Boerhaave's Red Pill.*—The basis of this nostrum is Cinnabar.

*Brodum's Nervous Cordial*, consists of the tinctures of Gentian, Columba, Cardamom, and Bark, with the compound Spirit of Lavender, and Wine of Iron.

*Caledonian Cream*, similar to Milk of Roses.

*Cephalic Snuff*, analogous to the Pulvis Asari comp., p. 508.

*Chamberlain's Restorative Pills for Scrofula.*—"The most certain cure for the Scrofula, or King's Evil, Fistula, Scurvy, and all impurities of the Blood." This nostrum is composed of Cinnabar, Sulphur, Sulphate of lime, and a little vegetable matter, perhaps gum.

*Chamomile Drops*, are spirit flavoured with essential oil of Chamomile.

*Charcoal, Concentrated solution of.*—A preparation is sold under this absurd name, for cleansing the teeth, and is nothing more than a tincture of Catechu.

*Chelsea Pensioner*, p. 235.

*Cheltenham Salts*, consist of Sulphate of Soda, 120 grains; Sulphate of Magnesia, 66 grains; Muriate of Soda, 10 grains; Sulphate of Iron, half a grain, and form a good purgative solution.

*Cheltenham Salts*, the original combined.—This compound is the product of evaporating Cheltenham water, consisting probably of sulphates of magnesia and lime, and muriate of soda, as stated in the first Table. On the old view of the nature of Mineral Waters, this, when dissolved in water, ought to form a saline water like the original, but it does not do so. The proper mode of imitating Cheltenham water, is to use the salts inferred, on Dr. Murray's view, to exist in the water, the quantities of which are stated in p. 558.

*Ching's Worm Lozenges.*—These consist of yellow and brown lozenges; the former are directed to be taken in the evening, the latter the succeeding morning. To prepare the yellow lozenges, take of Saffron, half an ounce; of Water, one gallon; boil and strain; add of White Panacea of Mercury, (Calomel washed in spirit of wine,) one pound, white sugar, 28 pounds; mucilage of tragacanth, as much as may be sufficient to make a mass, which roll out of an exact thickness, so that each lozenge may contain one grain of Panacea. For the brown lozenges take seven ounces of the Panacea, three pounds and a half of resin of jalap, nine pounds of white sugar, of mucilage of tragacanth, as much as may be sufficient: each lozenge should contain half a grain of Panacea. These, and most other nostrums for the cure of worms, contain, according to Dr. Paris, Calomel as their chief ingredient, combined with jalap, scammony, gamboge, or some other purgative. They are, he remarks, uncertain and dangerous remedies; the calomel being frequently very unequally diffused through the mass.

*Chittick's Remedy for the Stone.*—This nostrum, highly esteemed in the middle of last century, consisted of a fixed alkali in veal broth.

*Cochrane's Cough Medicine.*—White poppy heads without seeds are made into a decoction, which is strained, and boiled again with some vinegar, and brown sugar, until it assumes the consistence of syrup, which is then acidified by elixir of vitriol.

*Cold Cream*, p. 529.

*Colley's Depilatory.*—It consists of Quick-Lime, and a portion of Sulphuret of Potash. Many of the preparations sold as depilatories contain Potash as their basis, in some instances combined with lime to prevent its spreading.

*Corn Plaster.*—The green-coloured plaster sold under this name is usually composed of 3 parts of wax, 4 of Burgundy pitch, and 2 of common Turpentine, to which is added one part of verdigris.

*Count Warwick's Powder.*—The purgative long known and esteemed under this name, consisted of Scammony, Oxide of Antimony, and Cream of Tartar. It has been useful in intermittent fevers.

*Cough Drops*, are usually preparations of Opium, similar to paregoric elixir. In coughs arising from suppressed perspiration, or where there is a tendency to inflammation, they often do harm.

*Court Plaster.*—This is black silk brushed over ten or twelve times, with the following preparation: Dissolve half an ounce of Benzoin in six ounces of rectified spirit; in a separate vessel dissolve one ounce of Isinglass in half a pint of water; strain each solution, mix them, and let the mixture rest, so that the grosser parts may subside; when the clear liquor is cold, it will form a jelly, which must be warmed before it is applied to the silk. When the Plaster is quite dry, in order to prevent its cracking, it is finished off with a solution of four ounces of Chian Turpentine in six fluid-ounces of Tincture of Benzoin.

*Lady Crespigny's, or Lady Webster's Pill, or Dinner Pills*, called in the Codex Medicamentarius Parisiensis "Pilulæ Stomachicæ." Take of the best Aloes, six drachms; Mastich and Red Roses, of each two drachms; Syrup from Wormwood, as much as may be sufficient to form a mass. This mass is to be divided into pills of three grains each. The Mastich, Dr. Paris supposes to act by dividing the particles of the Aloes.

*Crême de Noyau.*—Bitter Almonds blanched, one ounce; Proof Spirit, half a pint; Sugar, 4 ounces. It is sometimes coloured with cochineal. The foreign Noyau, though differently prepared, appears to be indebted for its flavour to the same principles, a peculiar essential oil and prussic acid, p. 97.

*Daffy's Elixir*, is the Tinctura Sennae compositum, with the substitution of treacle for sugar-candy, and the addition of aniseed and elecampane root. Mr. Brande suspects that Opium is often present in it.

*Davidson's Remedy for Cancer*, composed of white oxide of arsenic, and powdered hemlock, may be useful if properly applied, p. 258.

*Delcroix's Poudre Subtil*, sold as a rapid and effectual depilatory; it consists of Quicklime and Sulphuret of Arsenic with some vegetable powder, but very unequally mixed. It can be of very little use.

*Dixon's Antibilious Pills.*—Aloes, Scammony, Rhubarb, and Tartar Emetic.

*Dutch, or Haerlem Drops.*—The basis of this nostrum is the residue after the re-distillation of Oil of Turpentine, which is a thick red resinous matter called Balsam of Turpentine. A preparation is also sold under the name of *Dutch Drops*, which is a mixture of oil of turpentine, tincture of guaiac, spirits of nitric ether, with small portions of the oils of amber and cloves.

*Dalby's Carminative.*—This consists of carbonate of magnesia, two scruples; oils of Peppermint, one minim; of Nutmeg, two minims; of Aniseed, three minims; of the Tinctures of Castor, thirty minims; of Assafœtida, fifteen minims; of the Compound Tincture of Cardamoms, thirty minims; Peppermint water, two fluid-ounces. This is apparently a judicious composition.

*Eau de Cologne.*—The following formula is given by Mr. Brande for preparing it. Take of Alcohol, one pint; Oil of Bergamotte, Oil of Orange-peel, Oil of Rosemary, of each one drachm; Bruised Cardamom Seeds, one drachm; Orange Flower Water, one pint. Distil (from a water-bath) one pint.

*Eau de Luce*, p. 367.

*Elixir of Longevity.*—An aromatic tincture with Aloes.

*Elixir, Stroughton's*, is a tincture of Gentian with the addition of Serpentaria, Cardamoms, Orange-peel, and some other aromatics.

*Elixir of Vitriol*, is the Acidum Sulphuricum Aromaticum.

*Essence of Bitter Almonds*, consists of one part of essential oil of Bitter Almonds, and seven parts of Rectified Spirit. This essential oil is a peculiar oil combined with Prussic Acid.

*Essence of Coffee.*—The Pulp of Cassia is said to form the basis of this article.

*Essence of Lavender*, see Lavender water.

*Essence, Pectoral, of Coltsfoot*, p. 244. A remedy that has often done much harm.

*Essence of Mustard, Whitehead's*, p. 404.

*Essence of Mustard Pills, Whitehead's*, Balsam of Tolu with Resin.

*Essence of Peppermint.*—A spiritous solution of the essential oil, coloured green by Spinach leaves.

*Essence of Senna, Selway's prepared.*—This is a concentrated infusion of Senna in combination with an Alkali.

*Essential Salt of Lemons.*—The preparation sold under this name, for removing iron moulds from linen, and ink stains from printed paper, consists of equal parts of Cream of Tartar and Superoxalate of potash.

*Ford's Laudanum.*—The Vinum Opii of the Pharmacopœia.

*Forge Water.*—This popular remedy, as a lotion for Aphthæ and other similar diseases, I am well satisfied, says Dr. Paris, possesses considerable efficacy. It is the water in which blacksmiths quench hot iron, and when taken early in the morning, when the mechanical impurities have subsided, is quite limpid; it appears to contain sulphate of iron, the suphuric acid being probably derived from the sulphur in the coals.

*Fothergill's Pills.*—Aloes, Scammony, Colocynth, and Oxide of Antimony.

*Freeman's Bathing Spirits.*—Linimentum Saponis compositum, coloured with Daffy's Elixir.

*Friar's Balsam, Wade's Drops*, and *Jesuit's Drops*, p. 348.

*Fumigating Pastiles.*—Benzoin generally constitutes the chief ingredient in these odoriferous fumigations; other odoriferous substances may be added, as in the following formula given by Dr. Paris: Take of Benzoin, one drachm; Cascarilla, half a drachm; Myrrh, one scruple; Oil of Nutmeg, Oil of Cloves, each ten grains; Nitre, half a drachm; Wood Charcoal, six drachms; Mucilage of Gum Tragacanth, as much as may be sufficient. Stephenson and Churchill give another formula. Take of Charcoal, eight ounces; Storax, Mastich, Benzoin, each one ounce; Copal, half an ounce. Reduce them to powder, and make into pastiles with starch mucilage. These pastiles are much used as incense in Roman Catholic countries.

*Gas Water.*—That which remains after coal gas has passed through the purifier; it contains Hydro-sulphuret, and Sulphuretted Hydro-sulphuret of Lime, and from this impregnation has been used with advantage in chronic cutaneous diseases.

*Godbold's Vegetable Balsam.*—In the specification of the patent for this nostrum, forty-two different vegetables are directed to be distilled, for the purpose of extracting their essences, which are to be mixed with Gum Dragon, Gum Guaiac, Gum Arabic, and Gum Canada, dissolved in double-distilled Vinegar, with a quantity of Storax dissolved in Spirits of Wine and Oil of Cinnamon. It is to be bottled off and kept three years before it is fit to be administered for the cure of Consumption, or any Asthmatic complaints. As Dr. Paris remarks, these directions are obviously false, and the Balsam is, in fact, little else than simple Oxymel.

*Godfrey's Cordial.*—Infuse nine ounces of Sassafras, and of the seeds of Caraway, Coriander, and Anise, of each one ounce, in six pints of water; simmer the mixture until it is reduced to four pints, then add six pounds of Treacle, and boil the whole for a few minutes; when it is cold, add three fluid-ounces of the Tincture of Opium. The extensive and indiscriminate use of this nostrum in the nursery, says Dr. Paris, is a subject of national opprobrium, and is so considered by foreign writers.

*Godfrey's Smelling Salts.*—This highly pungent preparation is obtained by re-subliming the common subcarbonate of Ammonia with Pearlash, and a proportion of rectified spirit: the potash of the latter salt probably abstracting a portion of carbonic acid from the ammoniacal carbonate.

*Golden Ointment*, p. 536.

*Golden Spirit of Scurvy Grass*, is a solution of Gamboge in the Spiritus Armoraciæ compositus.

*Gout Tincture, Dr. Wilson's*, is an infusion of Cholchicum: various other empirical remedies for the gout, of a similar nature, have been fabricated since the discovery of Veratria.

*Greenough's Tincture for the Teeth.*—The following receipt is given by Mr. Gray: Of Bitter Almonds, two ounces; Brazil Wood and Cassia Buds, equal parts, half an ounce; Root of the Florentine Iris, two drachms; of Cochineal, Salt of Sorrel, and Alum, equal parts, one drachm; Rectified Spirit, two pints; Spirit of Horse Radish, half an ounce.

*Gout Cordial*, is a mixture of the compound Tinctures of Rhubarb and Senna.

*Gowland's Lotion*, is a solution of corrosive sublimate in an emulsion formed of bitter almonds, in the proportion of about a grain and a half to a fluid-ounce. A solution of this mercurial salt in Spirit of Rosemary is also sold as an empirical cosmetic.

*Green's Drops;* the basis of these is corrosive sublimate.

*Guttæ seu Laudanum Abbatis Rousseau*—Take of White Honey, twelve ounces; Warm Water, three pounds. Dissolve the honey in the water, pour it into a matrass, and set it aside in a warm place: as soon as fermentation has commenced, add four ounces of good opium, having previously dissolved, or rather diffused it in twelve ounces of water; allow them to ferment together for a month, then evaporate until ten ounces only remain; filter, and add four ounces and a half of alcohol. A salt of morphia, probably the acetate, appears to be formed in this process.

*Grindle's Cough Drops*, are a preparation of Opium similar to Paregoric Elixir, only made with Rectified, instead of Proof Spirit, consequently more highly charged with stimulant materials.

*Guestonian Embrocation for Rheumatism.*—Take of Oil of Turpentine, a fluid-ounce and a half; of Olive Oil, a fluid-ounce and a half; of Diluted Sulphuric Acid, three fluid-drachms.

*Guy's Powder of Ethiopia.*—This once celebrated anthelmintic consisted of pure rasped Tin, Mercury, and Sublimed Sulphur triturated together.

*Hannay's Lotion or Preventive Water.*—This famous nostrum for the prevention of venereal infection was nothing more than a solution of caustic potash.

*Hatfield's Tincture.*—Guaiac and Soap, equal parts, two drachms: Rectified Spirit, a pint and a half.

*Henry's Aromatic Vinegar*, is the Acidum aceticum camphoratum, p. 342.

*Hiera Picra*, p. 511.

*Hill's Essence of Bandana.*—Guaiac, one ounce; Spirit, three fluid-ounces.

*Hoffman's Anodyne Liquor*, p. 373.

*Honey Water*, is usually a mixture of essences coloured with Saffron; a little honey is sometimes added, the viscidity of which retains the scent longer.

*Hooper's Pills.*—Pilulæ Aloes cum Myrrha, Sulphate of Iron and Canella Bark, to which is added a portion of Ivory Black. Dr. Barlow relates a case, in which these pills remained in the intestines for a twelve-month from their insolubility.

*Hudson's Preservative for the Teeth.*—Equal parts of Tincture of Myrrh, Tincture of Bark, and Cinnamon Water; to which are added Arquebusade and Gum Arabic.

*Hungary Water*, when genuine, is a pure spirit distilled from Rosemary. Mr. Brande states, that what is usually sold as Hungary water is a mixture of spirits of lavender and rosemary, but gives the following as the genuine recipe: "Take of Fresh Rosemary in blossom, four pounds; Sage in blossom, eight ounces; Ginger Root, two ounces cut. Bruise, and pour upon them twelve pints of rectified spirit, and two pints of water. Distil with a slow fire eleven pints.

*Huxham's Tincture of Bark*, p. 350.

*Ipecacuanha Lozenges.*—Each Lozenge contains half a grain of Ipecacuanha.

*James's Analeptic Pills*, consist of James's powder, gum ammoniac, and the pill of aloes with myrrh, equal parts, with a sufficient quantity of the tincture of castor to make a mass.

*Keyser's Pills.*—Acetate of Mercury triturated with Manna.

*Kirkland's Neutral Cerate*, is formed by melting together eight ounces of Lead Plaster with four fluid-ounces of olive oil, into which are to be stirred four ounces of prepared chalk; when the mixture is sufficiently cooled, four fluid-ounces of acetic acid, and three drachms of pulverized Acetate of Lead are to be added, and the whole stirred until nearly cold.

*La Motte's Golden Drops*, similar to Bestucheff's Tincture.

*Lavender Water*, p. 392.

*Lardner's Prepared Charcoal*, consists of chalk finely powdered, rendered black by the addition of charcoal or ivory black. It is used as a dentrifrice; the charcoal, though reduced to fine powder, is liable to abrade the enamel of the teeth.

*Lynch's Embrocation.*—Olive oil impregnated with bergamot, and some other essences, and coloured with alkanet root.

*Madden's Vegetable Essence*, little else than the Infusum rosæ compositum, with an increased proportion of Acid.

*Marsden's Anti-Scorbutic Drops.*—A solution of sublimate in an infusion of gentian.

*Marseilles Vinegar*, or *Thieves Vinegar*, p. 342.

*Marshall's Cerate.*—Take of Palm Oil, five ounces; Calomel, one ounce; Acetate of Lead, half an ounce; Nitrate of Mercury, two ounces.

*Mathieus' Vermifuge.*—This anthelmintic consisted of two distinct electuaries; the one for killing, the other for expelling the tape worm. The former consisted of an ounce of tin-filings, six drachms of the fern root, half an ounce of semina santonici, a drachm of the resinous extract of jalap, and of sulphate of potash, and a sufficient quantity of honey to make an electuary, of which a tea-spoonful was taken every three hours for two days; after which the latter electuary was given in the same dose, and consisted of two scruples of powdered jalap and sulphate of potash, one scruple of scammony, and ten grains of gamboge, made into an electuary with honey.

*Matthew's Pills.*—Of the roots of Black Hellebore, Liquorice, and Turmeric, equal parts; Purified Opium, Castile Soap, and Syrup of Saffron, the same quantity, made into pills with Oil of Turpentine.

*Matthew's Injection.*—This once celebrated remedy for Fistula in Ano was a diluted Tincture of Cantharides.

*Milk of Roses*, used as a repellent cosmetic, is a solution of corrosive sublimate in almond emulsion, with a little of sugar of lead, or subnitrate of bismuth. It may prove very hurtful.

*Moseley's Pills*, consist merely of Rhubarb and Ginger.

*Norris's Drops.*—A solution of tartarized Antimony in rectified spirit, disguised by some vegetable colouring matter.

*Norton's Drops.*—A disguised solution of corrosive sublimate.

*Nouffleur's Vermifuge.*—This celebrated specific for the tape-worm consisted of two drachms of powdered fern root, and a calomel and gamboge pill; the former was taken in a cup of water early in the morning, and the pill was administered two hours afterwards, and was aided by a subsequent dose of salts. If the worm was not expelled, these remedies were repeated on the following day.

*Opodeldoc, Steer's.*—Castile Soap, one drachm; Rectified Spirit, eight fluid-ounces; Camphor, three and a half drachms; Oil of Rosemary, half a fluid-drachm; Oil of Origanum, one fluid-drachm; Solution of Ammonia, six fluid-drachms.

*Oxley's Essence of Ginger*, is a solution of ginger in rectified spirit.

*Pate Arsenicale.*— A favourite French remedy for cancer. It consists of 70 parts of cinnabar, 22 of sanguis draconis, and 8 of white oxide of arsenic made into a paste, with saliva, at the time of applying it.

*Pearl White*, subnitrate of bismuth.

*Peter's Pills.*—Aloes, Jalap, Scammony, and Gamboge, each two drachms; Calomel, one drachm.

*Permanent Marking Ink*, is a solution of nitrate of silver thickened with sap green, or cochineal; the preparing liquor is a solution of soda boiled with gum, or some animal mucilage.

*Plunkett's Ointment for Cancer*, p. 258.

*Radcliffe's Elixir.*—Socotorine Aloes, six drachms; Cinnamon Bark and Zedoary Root, of each half a drachm; Rhubarb Root, one drachm; Cochineal, half a drachm; Syrup of Buckthorn, two fluid-ounces; Proof Spirit, one pint; Water, five fluid-ounces.

*Remedy for the Toothach.*—One much in use is a solution of two drachms of camphor in a fluid-ounce of oil of turpentine.

*Riga Balsam.*—Take of alcohol, 8 ounces; compound tincture of benzoin, 2 drachms; tincture of saffron, 1 drachm; mix. A popular nonstrum for sprains and bruises.

*Rob Anti-Syphilitique*, a French nostrum, containing corrosive sublimate. A strong decoction of the Arundo Phragmitis, or bull-rush, is made with addition of sarsaparilla and aniseed, which is evaporated and made into a rob, or syrup to which the sublimate is added.

*Roche's Embrocation*, p. 404.

*Ruspini's Tincture for the Teeth*, consists of the Root of the Florentine Iris, eight ounces; Cloves, one ounce; Rectified Spirit, two pints; Ambergris, one scruple.

*Rymer's Cardiac Tincture*, is an infusion of Capsicum, Camphor, Cardamom Seeds, Rhubarb, Aloes, and Castor, in Proof Spirit, with a very small quantity of Sulphuric Acid.

*Seidlitz Powders*, p. 274.

*Sirop de Cuisiniere* consists of decoctions of sarsaparilla, burrage flowers, white roses, senna and aniseed, to which sublimate is added; and the whole is then made into a syrup with sugar and honey.

*Smellome's Eye Salve*, consists of half a drachm of Verdigris finely powdered and rubbed with oil, and then mixed with an ounce of yellow Basilicon.

*Solomon Balm of Gilead.*—An aromatic tincture, of which cardamoms form the chief ingredient, made with brandy; according to some it contains cantharides. The spirit recommends it to dram-drinkers.

*Solomon's Anti-impetigines.* – A solution of corrosive sublimate.

*Speediman's Pills.*—Aloes, Rhubarb, Myrrh, Extract of Chamomile, and some essential oil of Chamomile.

*Spilsbury's Antiscorbutic Drops*, are said to consist of corrosive sublimate, prepared sulphuret of antimony, gentian root, and orange peel, equal parts; made into a tincture, and coloured with red saunders.

*Squire's Elixir*, a tincture made from opium, camphor, serpentaria, subcarbonate of potash, anise and fennel seed, and coloured with cochneal.

*Starkey's Pills.*—See Matthew's Pills.

*Starkey's Soap*, is formed by a long trituration of alkali with oil of turpentine.

*Mrs. Stephen's Remedy, for the Stone*, consisted of caustic-lime, which was produced by calcining the shells of eggs and snails, and made into pills with soap. A decoction was also administered, consisting of Chamomile, Fennel, Parsley, and Burdock, together with a portion of Alicant Soap. See p. 265.

*Story's Worm Cakes.*—Calomel and Jalap made into cakes, and coloured with cinnabar.

*Struve's Lotion for the Hooping Cough*, consists of one drachm of Tartarized Antimony, dissolved in two fluid-ounces of water, with one fluid-ounce of Tincture of Cantharides.

*Sulphur Lozenges.*—Sublimed Sulphur, one part; Sugar, eight parts, made with tragacanth mucilage. They are used in asthma and in hemorrhoids.

*Schwartz Drops*, for the cure of tape-worm, much used in Germany, consist, according to Mr. Brande, of half an ounce of Petroleum and six drachms of Tincture of Assafœtida; the dose is forty drops thrice a-day.

*Taylor's Red Bottle.*—Brandy coloured with Cochineal, and flavoured with Oil of Origanum.

*Taylor's Remedy for Deafness.*—Garlic infused in oil of almonds, and coloured by alkanet root.

*Tolu Lozenges.*—Sugar, eight ounces; Cream of Tartar, one ounce; Starch, two drachms; Tincture of Tolu of the Edinburgh Pharmacopœia, one fluid-drachm, and made up with mucilage of Tragacanth.

*Transparent Soap*, is made by carefully evaporating the alcohol solution.

*Venlo's Vegetable Syrup.*—Seems to contain corrosive sublimate as its active ingredient.

*Virgin's Milk.*—This cosmetic is a a spiritous solution of Benzoin, mixed with twenty parts of rose-water. A different preparation, sold under this name, is made by mixing Goulard's Extract with a solution of Alum ; the sulphate of lead formed is diffused in the liquor.

*Walker's Jesuits Drops*, a tincture of Guaiac, Balsam of Copaiba, and Oil of Sassafras.

*Ward's Essence for the Headach.*—The Linimentum Camphoræ Compositum.

*Ward's Paste for the Piles*, p. 517.

*Ward's White Drops*, an antiscorbutic remedy, formed by mixing sometimes solution of corrosive sublimate, sometimes solution of nitrate of mercury, with solution of carbonate of ammonia.

*Ward's Red Drops.*—A strong vinous solution of tartarized Antimony.

*Ward's Sweating Powders.*—A combination of Opium with Veratrum.

*Warner's Cordial.*—Rhubarb, one ounce : Senna, half an ounce ; Saffron, one drachm; Powdered Liquorice, four drachms ; Raisins pounded, one pound ; Brandy, three pints. Digest for a week, and strain.

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THE END.